



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ³ : G06F 7/08, G07F 7/02 H02J 7/00	A1	(11) International Publication Number: WO 85/ 01812 (43) International Publication Date: 25 April 1985 (25.04.85)
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(21) International Application Number: PCT/US84/01668

(22) International Filing Date: 15 October 1984 (15.10.84)

(31) Priority Application Number: 541,998

(32) Priority Date: 14 October 1983 (14.10.83)

(33) Priority Country: US

(60) Parent Application or Grant

(63) Related by Continuation

US 541,998 (CIP)
Filed on 14 October 1983 (14.10.83)

(71) Applicant (for all designated States except US): AVI-COM INTERNATIONAL, INC. [US/US]; 2040 East Walnut Street, Pasadena, CA 91107 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only) : SHILTON, Albert, R. [US/US]; 2856 Bottlebrush Drive, Los Angeles, CA 90077 (US). DE SMET, Greg, L. [US/US]; 1909 East Huntington Drive, Duarte, CA 91010 (US).

(74) Agents: YOUNG, Leo, J. et al.; Christie, Parker & Hale, Post Office Box 7068, Pasadena, CA 91109-7068 (US).

(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.

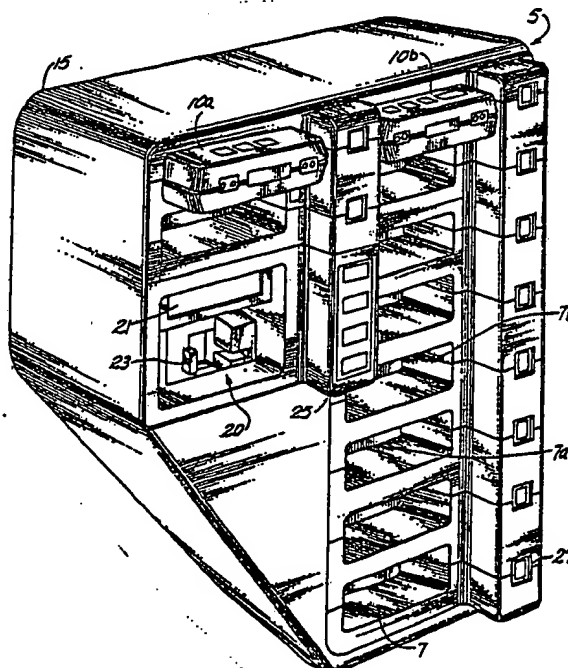
Published

With international search report.
With amended claims.

(54) Title: CREDIT CARD ACTIVATED VENDING MACHINE FOR BATTERY POWERED RENTAL ITEMS

(57) Abstract

An interactive system provides for displaying message on a display (21) to prompt use of manually controlled selectors (25, 27) and use of a record-member reader (23) to select a rental unit (10) which is dispensed from a housing (5) incident to the release of a locking mechanism (44). Each rental unit is portable and has interactive an input/output (131, 139). The system has a storage (200) for vending and recording accounting information used to bill customers gaining access to the rental units. The system is especially useful in commercial transport aircrafts and other passenger vehicles, and in waiting rooms in transportation terminals, hospitals, and the like.



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1 Credit card activated vending machine for battery powered rental
items.

Cross-Reference to Related Applications

5 This application is a continuation-in-part of
application Serial No. 541,998, filed October 14, 1983,
the disclosure of which is hereby incorporated by reference
herein.

Background of the Invention

10 The substantial amount of time people have on
their hands while in waiting rooms or while traveling on
aircraft or other transportation systems has led to the
recognition that a substantial market potential exists
for providing entertainment or educational services to
15 travelers.

In one approach that has been taken to tap part of
this potential market, audio systems are provided on
common carrier aircraft for use in listening to music
and the audio accompanying in-flight movies. Typically,
20 a passenger rents a headset for private listening to
the audio piped to each seat. The airline flight
attendants devote a great deal of time moving through
the aisles collecting rental fees for the headsets,
making change, distributing the headsets and vouchers
25 for refunds if necessary, and at the end of the flight,
spend more time collecting headsets.

In another approach that has been taken to tap
another part of this market, airline terminals have
been equipped with coin-operated television sets to



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1 provide a diversion for waiting passengers. This
approach is subject to various restrictions and other
disadvantages. For example, the television sets need
to be securely locked in place to guard against theft,
5 and their use is accordingly restricted to a single
location.

The development of sophisticated electronic micro-
circuits in recent years has led to commercial availa-
bility of portable electronic educational and entertain-
10 ment devices such as video games, training systems, and
the like. Such educational and entertainment devices
involve a wide spectrum of subject matter from maze
games to chess and the like. Because of this wide
spectrum, many different people with widely varying
15 tastes and needs have found it diverting, educational,
entertaining, etc., to use such devices, and they have
become very popular. In contrast to television sets,
these devices are highly portable. Most television sets
are somewhat bulky, and all of them can be used only
20 where broadcast signal reception is practical. This is
not the case within an aircraft. On the other hand,
the very fact that the entertainment and educational
devices are so highly portable and popular creates risks
of theft.

25 Summary of the Invention

The present invention takes advantage of the
capabilities of portable educational and entertainment
devices by providing rental units having such capabili-
ties and by providing for dispensing such units for
30 temporary rental use by users such as passengers on
aircraft and other transportation systems, by persons
in waiting rooms, and by others in situations where an
educational or entertainment unit provides a useful
and interesting diversion.



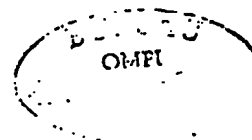
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1 The subject matter of the invention embraces
an overall system. An advantage of an overall system
embodying the invention is that it is generally user
5 operated and free of need for continual attention from
attendants having general responsibility for the facil-
ity where the rental units are dispensed and used. In
its presently preferred embodiment, the invention is
adapted for users who want to rent such units for
20 in-flight education and entertainment.

 The overall system includes a plurality of
rental units, and a housing in which units are stored
while they are available for rent. The rental units
can be electronic games, or similar educational devices
15 such as electronic chess games, tape recorders, or the
like. Significantly, each of the units is portable,
and accordingly a user renting one is not restricted to
using it at a single location. The housing includes
releasable locking means. During a dispensing mode of
20 operation, the releasable locking means releases a
selected unit so that it can be carried away from the
housing, and during a return-accepting mode of opera-
tion the releasable locking means captures a rental
unit being returned to the housing.

25 The locking means forms part of an interactive
access-control means. Being interactive, the access-
control means plays an important role in making the
system user operated, and does so during both the dis-
pensing mode and the return-accepting mode. The inter-
30 active access-control means includes displaying means,
data input means, and data processing means.

 The displaying means provides prompting messages
to guide the user to perform steps to rent a selected
unit. Guided by these prompting messages, the user per-
35 forms a few simple steps using the data input means and,



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1 in doing so, provides input data to the data processing means.

5 The data input means includes manually-operable input means for use in selecting a unit to be dispensed, and includes electronically controlled record-member reading means for use in deriving personal identification data from a record member. Preferably this reading means includes magnetic reading means for reading pre-
10 recorded data from a conventional magnetic card credit card.

The system includes memory means, and the data processing means includes means for storing data into the memory means to generate a data base for use in
15 billing for the rental of the rental units. Thus, the system provides for renting units on a credit basis, and minimizes the need for handling cash.

A system having the means summarized above provides the framework in which to incorporate, and cooperate
20 with, additional means to provide advantages in addition to those set forth above.

To provide an advantage relating to system inventory control, each rental unit has electronically readable means for providing unit-identification data. Further,
25 the system includes communication means for effecting communication between the data processing means and the electronically readable means in the rental units. Preferably, the communication means effects communication of data via infrared (IR) signals generated during the
30 dispensing mode of operation and during the return-accepting mode of operation. Based on data received via the communication means, the data processing means stores, in the data base it generates, unit-identification data for use in identifying rental units that have been
35 dispensed but not returned.

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To provide a separate additional advantage, each rental unit includes a rechargeable battery and contacts for receiving current to recharge the battery. Further, the system includes in the housing a plurality of interfaces each including means for supplying recharging current via the contacts.

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10 A system according to the invention may also be defined as a timed vending system providing for dispensing portable rental units and prompting each person using such a rental unit to return it. The timed vending system includes a multi-compartment dispenser and a plurality of rental units with each rental unit including controlled output means for communicating with a person using the rental unit. Each rental unit further includes timing means and means responsive to the timing means to disable the output means for the rental unit, and thereby prompt the user to return the rental unit to the dispenser. To provide flexibility, the timing means is settable and the dispenser includes means operative to set the settable timing means.

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20 This invention may also be defined as an overall system comprising a plurality of portable rental units, a plurality of subsystems each including a data base generating interactive vending apparatus, and a data collection apparatus. This system is flexible in allowing a user to rent a rental unit from one vending apparatus in the system and to return it to another vending apparatus in the system. Each rental unit includes memory means and means for writing data into and reading data from the memory means. During a dispensing operation, an interactive vending apparatus receives transaction data and communicates it to the memory means in the selected rental unit, then dispenses

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1 the selected rental unit so that a user can carry it
away. During a return-accepting operation, an interactive
vending apparatus retrieves transaction data from the
5 rental unit being returned and appends the retrieved
transaction data to the data base it is generating.
The data collection apparatus provides for sequentially
communicating with each of the subsystems to combine
into a memory means in the data collection apparatus
10 all of the data base information needed for billing.
The combined data base can then be provided to a separate
computer for sorting and the like.

The subject matter of the invention also embraces
a portable rental unit for use in a rental system.
15 Like the overall system, the portable rental unit may
be defined in various ways, and particularly with refer-
ence to elements in the rental unit that adapt it to
provide various advantages set forth above. In its
preferred embodiment, the rental unit includes elements
20 to adapt it to provide a range of advantages associated
with a user-operated system including automatic recharg-
ing of batteries, timed disabling to prompt return,
automatic unit-identification data communication to
facilitate inventory control, and transaction-data
25 storage to facilitate the generation of a data base for
billing.

The subject matter of the invention also embraces
a data base generating interactive vending apparatus
for use in renting rental units. The apparatus comprises
30 a housing having locking means therein. In its preferred
embodiment, the housing has a plurality of compartments
configured in accordance with a uniform size so that
any one of the compartments can store any one of a
plurality of standard-sized rental units. Preferably,
35 the locking means includes a plurality of locking mech-
anisms, one for each compartment.



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The locking means forms part of an interactive access-control means which further includes displaying means, data input means, and data processing means.

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The access-control means has a plurality of modes of operation, including a dispensing mode in which the displaying means prompts the manual use of the data input means to identify a selected rental unit, and the data processing means responds to the data input means to cause the locking means to release the selected rental unit so that it can be carried away from the housing. In the preferred embodiment, there is provided a card reader for reading prerecorded data from a record member such as a bank credit card having a magnetic stripe storing prerecorded personal identification (PIN) data.

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In use, a person who wants to rent a unit is prompted by the displaying means to perform manual steps. These steps include inserting a credit card or other record member into the card reader, and manually selecting a desired rental unit. In accordance with a particularly advantageous feature, the displaying means prompts the user to select the language, whether English, French, etc., in which he wants to receive his instructions. In response to the manual selection of one such language, the apparatus thereafter provides prompts to the user in the selected language. This feature is particularly advantageous in a preferred use of this invention in a commercial aircraft where many of the passengers speak different languages.

The access-control means further has a return-accepting operating mode in which a rental unit is returned to the housing and locked therein.



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1 One of the advantageous features of the housing is
that it includes means for supplying battery recharging
electrical power to the rental units while they are
5 stored in the housing. Another advantageous feature
resides in communication interfaces, each including
means for receiving item identification data for use in
keeping track of the rental items.

The apparatus also comprises memory means. The
10 data processing means includes reading means for de-
riving the prerecorded (PIN) data from a record member,
such as the above-mentioned bank credit card, and
further includes means for storing data in the memory
means to generate a data base for use in billing for
15 the rental of rental units.

According to a preferred feature, the apparatus
includes a real-time clock that the data processing
means interrogates in the course of the dispensing mode
of operation. The data processing means stores into
20 the memory means data corresponding to the time that a
rental unit is dispensed and related data identifying
the selected rental unit and the related PIN data.
Later, when the unit is returned, the data processing
means again interrogates the real-time clock and performs
25 a calculation to determine the billing charge for the
rental of the unit and causes the displaying means to
report those charges.

The foregoing and other distinguishing features of
the present invention are disclosed in detail in the
30 following detailed description and are set out in the
appended claims.



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Brief Description of the Drawings

FIG. 1 is a perspective view of a housing for use in a system embodying this invention; the housing depicted in FIG. 1 is representative of a front-loading configuration and has 10 compartments each for storing a rental unit;

FIG. 2 is a front elevation view of another housing for use in a system embodying this invention; the housing depicted in FIG. 2 also has a front-loading configuration and has 6 compartments each for storing a rental unit;

FIG. 3 is a side elevation view of the housing depicted in FIG. 2;

FIG. 4 is an exploded perspective view of a housing having the same general configuration as the housing depicted in FIG. 2, but having fewer compartments;

FIG. 5 is an exploded perspective view of a control assembly portion of the housing depicted in FIG. 4;

FIG. 6 is an exploded perspective view of a stackable dispensing cell arrangement used in assembling a housing for use in a system embodying this invention, and shows the preferred electromechanical locking arrangement used in an embodiment of this invention;

FIG. 7 comprises FIGS. 7A-7C; FIG. 7A is a top plan view of the electromechanical locking mechanism showing it in a retracted position; FIG. 7B is a perspective view of the electromechanical locking mechanism showing it in an extended position; and FIG. 7C is an exploded perspective view of the electromechanical locking mechanism;

FIG. 8 comprises FIGS. 8A-8C; FIG. 8A is an elevation view of an alternative front-loading configuration of a housing inset into a wall-mounted structure, and FIGS. 8B and 8C are side and top views thereof;



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FIG. 9 is a top plan view of a rental unit case;

FIG. 10 is a right side elevation view of the rental unit case, and shows a recess adapted for use in releasably locking the rental unit within a dispenser housing;

FIG. 11 is an end elevation view of the rental unit case, and shows indicia provided to assist a person in selecting the rental unit during a dispensing operation;

FIG. 12 is a bottom plan view of the rental unit case, showing an insert portion for affixing operating instructions;

FIG. 13 is a left side elevation view of the rental unit case;

FIG. 14 is an end elevation view of the rental unit case, and shows the portion of the case referred to herein as the front end;

FIG. 15 is a block diagram of circuitry and associated electronically controlled input/output means contained in a rental unit;

FIG. 16 is a block diagram showing circuitry on and associated with board 51; and

FIG. 17 is a block diagram showing circuitry in and associated with control module 20.



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Detailed DescriptionA. Overview of the preferred embodiment of the invention.

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This introductory portion of the detailed description provides an overview of the system constituting the preferred embodiment of this invention by briefly and generally describing the major elements of the system and the way in which those elements cooperate. Following this introduction, the major elements are more fully and specifically described in separate portions of the detailed description.

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The system is preferably used in a common carrier aircraft. As a whole, the system provides for selectively dispensing hand-held rental units that passengers can select, use during a flight, and then return before the end of the flight, and do so on their own without the need for flight attendants to devote much, if any, attention to the use of the system during the flight. This feature of minimizing the involvement of flight attendants is particularly advantageous in comparison with the situation that prevails with the renting of headsets on flights. In that situation, the flight attendants devote a great deal of time moving through the aisles collecting rental fees, making change, distributing the headsets and vouchers for refunds if necessary, and at the end of the flight the headsets need to be collected.

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In this system, a wide variety of different types of rental units can be provided, such as electronically operated game units or educational units for passenger entertainment or education. A separate portion of this detailed description is devoted to the details of a representative one of these rental units. For purposes of this introductory overview, it bears mention that



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such a representative rental unit is, in comparison with a headset, a fairly expensive item. The system provides highly advantageous features of safeguarding these rental units to minimize the risk of theft. One such advantageous safeguarding feature resides in an automatically-timed disabling of each rental unit so that the passengers will appreciate that the rental units will be useless to them if they take the rental units off the aircraft. To this end, each rental unit preferably includes timing means and means responsive to the timing means for disabling the intended operation of the rental unit. The system further provides a positive incentive for the passengers to return the rental unit in a timely manner. This advantage arises from an overall feature of the system whereby a passenger uses a conventional credit card to get access to a rental unit, and while doing so is presented with a display provided by the system to notify the passenger of a refundable deposit charge that will be billed to the credit card account unless the rental unit is returned.

In addition to the foregoing safeguarding features, the rental units have other advantageous features in relation to the system as a whole. One such advantageous feature resides in a standardized case that can be used to house numerous types of electronic games having a keypad and a display. The standardized case is sized and configured to facilitate handling it in use and to facilitate its releaseable storage, dispensing, and return.

The system includes at least one dispenser, and a preferred feature of the invention is that any one of multiple dispensers can be used interchangeably by a passenger when returning a rental unit. A separate



1 portion of this specification is devoted to the details
of the dispenser. For purposes of this introductory
overview, it bears mention that each dispenser includes
5 a housing defining a plurality of storage compartments,
each for releasably storing a rental unit. Each dispenser
contains a data processing subsystem and interfacing
means to enable the data processing subsystem to cooperate
10 with each rental unit stored in the dispenser during
various modes of operation, including a dispensing mode
of operation.

In the dispensing mode of operation, a passenger
examines the dispenser and sees a display of the choices
available. Preferably, each rental unit has on its
15 case indicia such as the title of the game and a symbol
indicating the nature of the game. The dispenser
housing has, next to each storage compartment, a switch
that the passenger can push to select the desired
rental unit. The dispenser housing also includes a
20 plurality of electromechanical locking mechanisms, one
for each storage cavity, to hold the rental units
captive.

To aid the passenger, the dispenser housing has a
language-selection feature. To this end, there is a
25 message display and there are four language-labelled
switches; the passenger pushes one of these to select a
language desired for receiving further prompting
instructions via this message display. In response to
prompts issued via the message display, the passenger
30 inserts a credit card into a slot forming the mouth of
a card reader in the dispenser.

A data processing subsystem in the dispenser
cooperates with the card reader to read prerecorded
data on the credit card. Preferably this data includes
35 expiration-date data that is checked to ensure that the



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inserted card is valid. Also, a personal identification number (PIN) is read from the card, verified, and then stored in a memory within the data processing system as part of a data base generated by the system. This data base is used later for billing purposes. Preferably, a check-sum procedure is involved in verifying that the PIN data is valid.

10 If the inserted card is valid, the data processing subsystem causes the message display to display a notice that the passenger's credit card account has been charged for a refundable deposit to provide the incentive to return the rental unit, and has been charged a rental fee for the rental of the selected rental unit.

15 The data processing subsystem also causes the message display to display a notice that the passenger is afforded a grace period whereby if the passenger returns the rental unit after a relatively short period, such as fifteen minutes, the passenger's credit card account will not be charged as described above. At the end of the dispensing mode, the data processing system causes the electromechanical locking mechanism to release so that the passenger can withdraw the rental unit, take it to a seat and use it during the flight. 20 Before this releasing operation, the data processing system in the dispenser communicates via an interface to preset the timing means in the selected rental unit. This presetting operation takes into account factors such as the estimated time of arrival and the current time, and causes the timing means in the rental unit to time out a maximum rental period that ends a predetermined period, such as fifteen minutes before the scheduled arrival time.

30 B. Dispenser housing

35 FIG. 1 shows a housing 5 that constitutes a repre-



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tentative example of a housing for use in a system
embodying this invention. Housing 5 has ten compartments,
a representative one of which is indicated at 7. Each
5 of the ten compartments provides for storing a rental
unit. As depicted in FIG. 1, eight of the compartments
are empty, and two of them are storing rental units 10a
and 10b. Each such rental unit has a case shaped and
sized in accordance with a standard configuration
10 adapting the rental unit to be inserted into, stored
in, and withdrawn from any one of the compartments 7.
FIGS. 9-14 are various views of a representative rental
unit case. In this representative example, the rental
unit includes a chess game and has a display screen 11
15 oriented in a plane extending between the front end 12
of the case and an intermediate portion 13 of the case.
A control keypad 14 is oriented in a plane extending
away from the intermediate portion 13.

With reference again to FIG. 1, housing 5 has a
20 front-loading configuration. That is, each of its
compartments is oriented such that the front end 12 of
a rental unit case enter the compartment first as the
rental unit is inserted into the compartment. Housing
5 can be hung on a wall of an aircraft; its overall
25 configuration is particularly suited so as to be hung
along a transversely extending wall of a large aircraft.
Generally, there is more clearance space perpendicular
to such a transverse wall than the clearance space
perpendicular to a side wall of the aircraft. Housing
30 5 maximizes the use of such clearance space by having
the longest dimension of each compartment extend per-
pendicularly from the wall. An alternative side-
loading arrangement, depicted in FIG. 1, of the above-
identified application Serial No. 541,998, has the long-
35 est dimension of each compartment extending parallel to
the aircraft wall on which it is hung. The side-



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loading configuration of that housing offers the advantage of occupying less of the clearance space, whereas the front-loading configuration of the housing of FIG. 1 offers the advantage of maximizing the number of storage compartments per unit area of wall space. Another alternative frontloading arrangement is involved in the housing depicted in FIGS. 2 and 3, and another alternative front-loading arrangement is depicted in FIG. 8. In the housing of FIGS. 2 and 3, and in the housing of 5A of FIG. 8, rental units load into and are withdrawn from the compartments in the same way as the housing of FIG. 1. However, the housing of FIGS. 2 and 3 is adapted to be hung from a side wall of an aircraft with the longest dimension of each compartment extending parallel to the wall. The overall size of the housing is of course subject to variation. Suitably, the housing of FIGS. 2 and 3 is approximately two and one-half feet high, projects approximately eight and one-half inches from the side wall, and extends approximately one foot along the wall.

Housing 5 shown in FIG. 1 comprises a plastic shell 15 which surrounds various building block elements. One such building block element is a stackable tray 17 that defines the top of one compartment 7a and the bottom of another compartment 7b which is immediately above compartment 7a.

As shown in the exploded view of FIG. 4, stackable tray 17 is installed within a frame 18 during assembly of the housing and is supported therein by channels 19 extending along opposite side walls of the frame. Further details regarding stackable tray 17 are described below with reference to FIG. 6. Another building block element is a control assembly 20 which is shown in more detail in FIG. 5. The portion of control assembly 20



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1 seen in FIG. 1 includes a display 21, a magnetic card
credit card reader 23, and a bank of four membrane
switches 25. The membrane switches 25 are provided to
5 enable a passenger to select one of four available
languages which receive prompting messages via the
display 21. The switches 25 are labelled to indicate
the languages available, for example, English, Espanol,
Deutsch, and Francais.

10 Suitably, display 21 comprises a commercially
available alphanumeric fluorescent display manufactured
by Industrial Electronic Engineers, Inc. as model number
03600-22-040. This display device responds to character-
coded data signals to display alphanumeric characters
15 in dot matrix form to display messages of up to twenty
characters per line on two lines.

Display 21 forms part of an interactive access-
control means which also includes data input means,
data processing means, and locking means in the housing.

20 In the preferred embodiment, the data input means
includes the card reader 23 and a bank of membrane
switches 27, each of which is positioned adjacent a
respective compartment. The data processing means,
described in more detail in a separate section below,
25 receives input data during a dispensing mode of operation
by causing the display 21 to prompt the use of membrane
switches 27 to select a rental unit and by causing the
card reader 23 to derive data from a record member such
as a conventional magnetic card credit card.

30 Reference is now made to FIG. 5 for more details
regarding control assembly 20. Preferably, control
assembly 20 includes a hinged door 30 to cover a portion
of the control assembly 20 that is intended to be used
by attendants, such as flight attendants. This portion
35 includes a card reader 32 and a numeric keypad 34.



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regarding time of day, estimated time of arrival of the flight, etc. Further, a system embodying this invention generates a data base and these components are used to gain access to the data base.

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The control assembly 20 contains a number of printed circuit boards carrying electronic components incorporated into the data processing means and memory means. In a conventional manner of arranging such printed circuit boards, there are a group (five in total) of printed circuit boards that each fit into vertically extending slots 36 and connect into a mother board (not shown) that extends perpendicular to the group of printed circuit boards.

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Reference is now made to FIG. 6 for more details regarding a stackable dispensing cell arrangement that includes the tray 17. Preferably, tray 17 is a molded plastic piece having a divider wall 40, the upper surface of which defines the floor of a compartment and the lower surface of which defines the roof of another compartment. Divider wall 40 has a generally planar portion 41 that is inclined downwardly and a generally planar portion 42 that is inclined upwardly. The foregoing slightly V-shaped configuration of the divider wall makes it easy to slide a rental unit into an empty compartment during a return-accepting mode of operation. As a rental unit slides into the compartment, the leading end of the rental unit butts into a nose portion 43 of an electromechanical locking mechanism 44 that is described in more detail below with reference to FIGS. 7A-7C. Briefly, locking mechanism 44 is an assembly that is supported in tracks 45 within a generally rectangular pocket portion 47 of tray 17. Pocket portion 47 is defined by an outer side wall 48 and an



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intermediate wall 49. A printed circuit board 51 also fits within pocket portion 47 and is held in place by tracks such as track 52. According to a highly advantageous feature, printed circuit board 51 supports power supply circuitry that receives unregulated 400 Hz a.c. aircraft power and produces a d.c. supply voltage. The a.c. power is supplied to each compartment by a daisy-chain cabling arrangement of standard length cable sections each having multi-pin connectors at opposite ends (the cables are not shown). Each printed circuit board 51 has a pair of multi-pin connectors 53i and 53o for connection to the multi-pin connectors of two cable sections. Board 51 has printed conductors interconnecting connectors 53i and 53o, and printed conductors that in effect constitute taps for applying the a.c. power to the power supply. The d.c. voltage produced by the power supply circuitry is impressed on charging contacts 54 and 55 that are supported in notches within a rear wall 56 of tray 17. These contacts engage corresponding contacts on an end wall of a rental unit while the rental unit is stored within the compartment, and provide for recharging a rechargeable battery within the stored rental unit. It will be appreciated that there is a separate printed circuit board 51 for each compartment and thus a separate d.c. power supply available for each stored rental unit. This modularization of the overall system power supply has substantial advantages. If only one power supply were to be used, it would need to be capable of supplying a substantial peak current on occasions and would accordingly require bulky, heavy components. Because of the modularization,



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each power supply needs to provide as a peak current only the amount needed for rapid charging of one unit's rechargeable battery. A further advantage of this modular approach arises from the daisy-chain cabling arrangement. Because standard-length cable sections are used, providing more or fewer compartments in a dispenser housing does not create any design problem with respect to distributing a.c. power to the compartments.

In addition to the above-mentioned power supply circuitry, each printed circuit board 51 also carries circuitry used in effecting communication with a stored rental unit via infrared (IR) communication. To this end, in the intermediate wall 49 there is an infrared filter 49F through which the IR propagates during such communication.

Reference is now made to FIGS. 7A-7C for more details regarding the electromechanical locking mechanism 44.

The locking mechanism 44 is an assembly that includes a support member 60 having a generally rectangular portion 62 that is vertically oriented when installed in tracks 45 of wall 49. Support member 60 has two horizontally oriented tabs 63 and 64 that are in a common plane, and has two vertically oriented tab portions 65 and 66 each of which projects into pocket portion 47 of tray 17.

The locking mechanism 44 further includes a slide plate 68 that rests on tabs 63 and 64. Slide plate 68 has a pair of collinear guide slots 70 and 72. A screw 74 fastened to tab 64 defines a guide post extending through slot 72. The guide slots are oriented at an angle of approximately thirty degrees relative to



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intermediate wall 49. Thus, a force acting against the nose portion 49 of the slide plate 68 along a line parallel to intermediate wall 49 causes slide plate 68 to slide from its retracted position (i.e., the position shown in FIG. 7A) along a path approximately thirty degrees relative to intermediate wall 49. In the course of such sliding, a dead bolt portion 80 of the slide plate 68 projects further into the compartment. Dead bolt portion 80 is configured to engage a recess 82 (FIG. 10) in the side wall of a rental unit case. When a passenger returns a rental unit by inserting it into a compartment, the rental unit slides by its own weight down the inclined portion 41 (FIG. 6) of divider wall 40, and the front end of the rental unit pushes against nose portion 43, causing slide plate 68 to slide from its retracted position toward an extended position and dead bolt portion 80 moves into engagement with the recess 82.

Locking mechanism 44 also includes a pair of springs 84 and 86, a solenoid 88, and a pivoted arm 90. Spring 84 is horizontally oriented and connected between slide plate 68 and tab 64 to provide a bias force urging slide plate toward its retracted position. Spring 86 is vertically oriented and connected between tab 66 and a tab portion 92 of pivoted arm 90 to provide a bias force urging pivoted arm 90 to rotate clockwise as viewed in FIGS. 7B and 7C. A pin portion 94 of support member 60 defines the axis of rotation for pivoted arm 90.

Pivoted arm 90 has a tooth 96 that, while the slide plate is in its extended position, acts as a releasable stop to keep it in such position. In such



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portion, tooth 96 abuts end 97 of slide plate 68. When solenoid 88 is temporarily energized by a current pulse flowing through a cable assembly 98, the solenoid 88 forces tab portion 92 of pivoted arm 90 to move down away from end 97 of slide plate 68, then spring 84 causes slide plate 68 to slide to its retracted position. In doing so, the bottom surface of slide plate 68 becomes a roof over tooth 96. Thus, after the solenoid 88 is energized, because the bottom surface of slide plate 68 abuts tooth 96, pivoted arm 90 is prevented from moving up in response to the bias force caused by spring 86.

The foregoing arrangement of locking mechanism 44 has substantial advantages. The dead bolt-type action of having dead bolt portion 80 move into and out of the compartment to engage and disengage the recess 82 is advantageous. If someone tries to tamper with the system by pulling on a rental unit that the system has not dispensed, the pulling force applies loads as follows. The recess 82 applies a horizontally directed load on dead bolt portion 80 and, in turn, the end 97 of slide plate 68 applies a horizontally directed load on tooth 96. In turn, pivoted arm 90 applies a horizontally directed load on pin 94 of support member 60. Thus, there is little, if any, load on the solenoid 88. Another advantage inheres in the way that the locking mechanism captures a rental unit being returned. No electrical power needs to be applied to solenoid 88 for this capturing to occur. A passenger simply inserts a rental unit into an empty compartment, and the rental unit slides on its own weight to cause slide plate 68 to move to its extended position and allow spring 86

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1 to force pivoted arm 90 to rotate and bring tooth 96
into its stop position.

5 A further preferred feature of the locking mechanism
resides in a microswitch 100 that is mounted to support
plate 60. When slide plate 68 is in its extended posi-
tion, pivoted arm 90 is horizontally oriented whereby
its bottom edge 102 is spaced above sensing arm 104 of
microswitch 100. On the other hand, when slide plate
10 68 is in its retracted position, pivoted arm 90 is
oriented at an angle relative to the horizontal and its
lower edge 102 pushes sensing arm 104 down. Thus, the
microswitch 100 provides an on/off electrical indication
of whether the slide plate 68 is in its extended or
15 retracted positions. The system data processing means
performs various control functions based on the status
of microswitch 100.

C. Rental Unit Case

20 With reference now to FIGS. 9-14, there will be
described further details regarding the rental unit
case. As shown in FIG. 11, one end of the case is
provided with audio jacks 110 and 112. For some but
not necessarily all of the rental units used in the
system, it is desirable to connect a headset to an
25 audio jack in the rental unit. For a rental unit
intended for playing chess, there is no need to provide
audio, but for purposes of standardization it is
desirable to equip each case with such audio jacks.
For other rental units, such as tape recorders or units
30 containing maze games or the like, the audio jacks are
involved in the intended operation of the rental unit.

As shown in FIG. 14, the front end of the rental
unit case includes a pair of contacts 114 and 116 that



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are used for making electrical contact with contacts 54 and 55 (FIG. 6) while the rental unit is stored in a compartment and thereby provide an interface for effecting recharging of a rechargeable battery contained within the rental unit.

As shown in FIG. 10, the right side of the rental unit case has an infrared filter 120. When the rental unit is stored in a compartment, the IR filter 120 is aligned with the IR filter in intermediate wall 49 (FIG. 6)

D. Data Processing and Control System

Reference is now made to FIG. 15 which shows a block diagram of case-contained means 130 comprising circuitry and associated electronically-controlled input/output means; the case-contained means 130 is contained in a rental unit. unit. Preferably, the circuitry is supported by three printed circuit boards supported in a conventional way inside the rental unit case. There are many commercially available portable electronic educational and entertainment devices that include a display and a printed circuit board that supports a microprocessor and associated circuitry such as a random access memory (RAM) and a read only memory (ROM). Inasmuch as these commercially available devices are mass produced, their price reflects the economy of mass production. In manufacturing a system embodying this invention, it is preferable to buy such commercially available devices and take out of each device's case the display and printed circuit board and then install them within the standard-sized rental unit case.

In the block diagram of FIG. 15, one block 131 depicts such a purchased display and printed circuit



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board. A block 135 represents a second of the three printed circuit boards contained in the rental unit. This second printed circuit board has circuitry used uniformly in all the rental units. A block 137 represents a third printed circuit board which has conventional circuitry that provides for interfacing the uniformly used circuitry of board 135 with the circuitry of board 131. A block 139 represents a tactile membrane switch assembly that serves as manually-controlled input means for using the rental unit. For a chess game such as the one depicted in FIGS. 9-16, switch assembly 139 has thirteen switches arranged in four rows. It should be appreciated that the number and functions assigned to the switches of switch assembly 139 depends upon the intended operation of the rental unit. It should also be appreciated that the switches of switch assembly 139, together with the display of block 131 constitute an input/output means for interactive communication with a person using the rental unit.

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As indicated in FIG. 15, board 135 supports circuitry 140 including a control microprocessor and charging electronics, a random access memory (RAM) 142, a programmable read-only memory (PROM) 144, and a tune-out counter 145. A PROM rather than a ROM is used in furtherance of the goal of uniformity of construction of board 135. Various minor kinds of special functions required for compatibility with different purchased boards 131 are easily handled by adapting the programming of PROM 144.

Significantly, each rental unit contains interfacing means including a data communications interfacing means preferably comprising an IR communications transmitter



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1 and receiver 150, and including the charging contacts 114 and 116.

5 When the rental unit is stored in a compartment, charging current received via the charging contacts 114 and 116 is applied to rechargeable battery 152.

10 When a rental unit is stored in a compartment, IR transmitter and receiver 150 can transmit and receive data through IR filters in the case and in the intermediate wall of the tray of the compartment. During a dispensing mode of operation, various data are communicated to the selected rental unit. Such data include data relating to billing and data relating to turn-off time. The data relating to billing include the personal identification number retrieved by card reader 22 (Fig. 1). The billing data communicated to the rental unit are stored in RAM 142 under control of the microprocessor in circuitry 140. Thus, a copy of the billing data is in effect hand carried by the passenger and during a return-accepting mode of operation can be transmitted out of the rental unit into any dispenser to which the passenger returns the rental unit.

25 As to controlling turn-off time, the time-out counter 145 is preset in accordance with tune-out data received during the dispensing mode of operation. In a conventional manner, time-out counter 145 counts clock pulses from a conventional clock pulse source (not separately shown). Suitably, each such clock pulse decrements counter 145 until the counter 145 reaches an all-zero value, whereupon a signal is applied to a light emitting diode (LED) 153 to prompt the passenger to return the unit. Also, battery power normally applied to board 131 is switched off so that the passenger can



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1 no longer use the rental unit for its intended purpose,
thereby providing positive impetus for the passenger to
return the rental unit.

5 Reference is now made to FIG. 16 which shows a
block diagram of circuitry on and associated with each
board 51 (FIG. 6). As has been described above, a
daisy chain arrangement is used to distribute a.c. power
to each compartment. This daisy chain arrangement is
10 represented in FIG. 16 as power source daisy chain 160.
A conventional Electro-Magnetic Interference (EMI)
filter 162 is preferably connected to daisy chain 160.
In each compartment, there is a board 51 having an
input connector 531 and output connector 530, forming
15 part of daisy chain 160, and standard-length cable
sections interconnect the daisy chain 160 together
between compartments. A local power supply 164 is on
each board 51 to produce unregulated d.c. power from the
ac power carried by daisy chain 160. The d.c. power so
20 produced is applied to control electronics 166 which
feeds it through to, among other things, charging
contacts 54 and 55. Thus, while a rental unit is in
the compartment, d.c. power feeds from local power supply
164 to the rechargeable battery 152 (FIG 15) in the
25 rental unit via a path including contacts 54 and 55 in
the compartment and contacts 114 and 116 (FIG. 14) on
the rental unit case. Also while the rental unit is in
the compartment, the IR transmitter and receiver 150
(FIG. 15) is in position to communicate with an IR
30 transmitter and receiver 168 on board 51. Data
communicated via IR flows through a path including data
input/output circuitry 170 on board 51. Suitably,
each board 51 in the housing has a unique address,
suitably defined in a convention way by a DIP (Dual In-
35 line Package) switch (not separately shown) in I/O



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1 circuitry 170. Because each board 51 has a separate
address, it is practical to employ a data daisy chain
172 to form a serial data flow path for communicating
5 data between anyboard 51 and central data processing
circuitry contained in control module 20 (FIG. 5).

During a dispensing mode of operation, I/O circuitry
170 receives signals from daisy chain 172, including an
address signal. The receipt of an address signal
10 corresponding to the DIP-switch defined address effects
a selection of the board 51 for the purpose of distributing
data. After this selection occurs I/O circuitry 170
receives billing data from daisy chain 172 and causes
IR transmitter and receiver 168 to communicate it to
15 the RAM 142 (FIG. 15) in the rental unit. Then, I/O
circuitry 166 causes control electronics 166 to apply
energizing current to solenoid 88 of the locking
mechanism to release the selected rental unit so that
it can be withdrawn from the compartment.

20 During a return-accepting mode of operation,
microswitch 100 provides a signal to control electronics
166 indicating that the locking mechanism has been
placed in its extended position. The mere fact that
the locking mechanism is in the extended position is
25 not enough to compel the conclusion that a rental unit
has been returned. In other words, someone tampering
with the housing might push some object against nose 43
(FIG. 7A) to cause the locking mechanism into its
extended position. For this reason, the system of this
30 invention preferably includes means for making extra
checks as to whether a rental unit is in place within a
compartment. A double check is provided by monitoring
IR communication and a triple check is provided by
monitoring the d.c. recharging interface. When it is a
35 rental unit that has been inserted in a compartment,



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1 the IR transmitter of the rental unit communicates with
the IR receiver in the compartment, and the contacts
114 and 116 of the rental unit draw a trickle current
5 from contacts 54 and 55. The central data processing
circuitry receives data concerning these conditions via
daisy chain 172.

Reference is now made to FIG. 17, which shows a
block diagram of circuit means in and associated with
10 control module 20 (FIG. 5), and also shows equipment
involved in retrieving a data base generated by the
system. The data base is generated a record at a time,
each record of which is stored in a non-volatile storage
200. Suitably, a bubble memory is provided to perform
15 the function of non-volatile storage 200.

Data base records are stored in storage 200 under
control of main processor 210 which comprises a
conventional integrated circuit microprocessor, ROM, and
RAM (not individually shown). Main processor 210
20 responds to computer program instructions stored in the
ROM in accordance with known program-control principles
to control the input of data, the processing of data,
the storage of data, and the outputting of data.

Input data are provided via various conventional
25 circuits and devices including the credit card reader
22, the numeric key pad 34, the service card reader 32
and I/O circuitry 220.

Main processor 210 forms part of the access-control
means of a system in accordance with this invention. During
30 a dispensing mode of operation, a passenger inserts a
record member into card reader 22. The record member
may be a conventional magnetic card credit card
(represented in FIG. 17 as Mag Card 230) or a temporary
card issued for cash by a flight attendant (the temporary
35 card is represented in FIG. 17 as "Script" card 240).



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The script card feature is a practical way to deal with the situation in which a child, too young to have a bank credit card, wants to rent a rental unit.

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When a bank card is used, main processor 210 communicates with card reader 22 to obtain PIN data and store such PIN data in non-volatile storage 200. As described above, such PIN data is also distributed to the affected rental unit. This is achieved via I/O circuitry 220 and daisy chain 172. Data as to which rental unit has been selected (by means of switches 27) is provided via I/O line 250.

10

During a flight, most of the time, main processor 210 is in an ideal mode of operation awaiting action on the part of a passenger to start either a dispensing operation or a return-accepting operation. In such ideal modes, main processor 210 causes prompting display 21 to present, on a cyclical basis, a series of prompting messages each in one of four languages. Thus, a person who speaks Spanish, for example, will see a temporary message prompting the selection of the Espanol switch 25, followed by a similar message in each of the other languages available. If the passenger speaks English, for example, and responds to the language-selecting prompting message by pushing the English switch 25, thereafter, messages displayed on display 21 will be in English throughout the ensuing dispensing operation.

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One such prompting message prompts the passenger to insert a card into the card reader 22. When the passenger does so, main processor 210 causes card reader 22 to retrieve prerecorded PIN data from the inserted card. Preferably, the processor executes a check-sum algorithm to verify the validity of the PIN data. If the PIN data is valid, then dispensing operation can proceed.

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As part of the operation, main processor 210 causes display 21 to present a sequence of instruction messages including, preferably, a warning. Such warning preferably
5 advises the passenger as to a charge that will be incurred in the event that the rental unit is not returned, and as to charges for a rental unit that is temporarily rented and property returned.

Also, main processor 210 causes display 21 to
10 present a message prompting the passenger to push one of the switches 27 to select a rental unit. Main processor 210 receives data as to such selection via I/O line 250 and I/O circuitry 220. Such data is included within the record stored into the data base.
15 Also, data as to current time, preferably in standard form (Greenwich Mean Time) is included in the record on the basis of time data made available by a real time clock 270. Such storage of data from real time clock 270 occurs also during the return-accepting mode of
20 operation and provides a basis for calculating elapsed time of rental. Based on the elapsed time calculation, main processor 210 calculates a rental charge and causes display 21 to present a message concerning the charge.

As mentioned above, the numeric keypad 34 is used
25 by service personnel. Preferably, each person who is authorized to service the system has a special security card which is inserted into service card reader 32 where prerecorded information is read from the card. The card reader 32 communicates with processor 210
30 during such servicing and accepts keyed-in data from numerical key pad 34 to enable information to be dumped from the storage 210 via a conventional RS232 data communication port 300 into a hand-held data collection subsystem 310.

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The hand-held data collection system includes an RS-232 data communication port 320, a control processor 330, and a non-volatile storage 340. Suitably, an electrical connector is provided on the housing at any convenient place (such as the bottom surface) so a mating electrical connector on a cable extending from the hand-held data collection subsystem can be connected to receive data from the data base generated in use of the access-control subsystem.

10

The data gathered by the data collection subsystem is sorted appropriately and transmitted by a conventional data line to a main computer system 400. The sorting feature is significant in that the data collection subsystem is used with a plurality of the access-controlled subsystems. Thus, when a particular passenger rents several items from several different subsystems, the appropriate records for that passenger are grouped together through the sorting operation.

15

Another aspect of the dispensing operation involves the retrieval of unit identification data. That is, before the locking mechanism is released, the IR communication means are used to retrieve data from the selected rental unit that identified the one that is being rented by the passenger controlling the dispensing operation. Such unit identification data is included in the record being added to the data base. When the rental unit is returned after remote use, the unit-identification data is retrieved in the same way and the data base is updated to show the return of the rental unit. While the rental unit is out, the data base reflects that fact. Preferably, near the end of a flight, main processor 210 causes display 21 to show information used by flight attendants in ensuring that all rental units have been returned. That is, the main

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processor retrieves records from the data base stored
in storage 200 and, for each record that has a field

5 indicating withdrawal, but no return, the processor
causes the display to show information about the rental
unit involved.



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WHAT IS CLAIMED IS:

1. A system comprising:

5 a plurality of portable rental units, each
having electronically readable means for providing
unit-identification data;

a housing for storing a plurality of said
rental units;

10 interactive access-control means including
displaying means, data input means, data processing
means, and locking means in the housing;

the data input means including manually-
operable input means for use in selecting a unit to be
dispensed, and including electronically-controlled
15 record-member reading means for use in deriving
prerecorded personal identification data from a record
member;

the interactive access-control means having a
plurality of modes of operation including a dispensing
20 mode in which the data processing means receives input
data by causing the displaying means to prompt the use
of the manually-operable input means to select a rental
unit and by causing the record-member reading means to
derive personal identification data, and in response to
25 the input data causes the locking means to release the
selected rental unit so that it can be carried away
from the housing, and further including a return-
accepting mode in which a rental unit is returned to
the housing and captured by the locking means therein;

30 communication means for effecting communication
between the data processing means and the electronically
readable means in the rental units;

memory means; and



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the data processing means including means for storing data into the memory means to generate a data base including personal identification data for use in billing for the rental of the rental units, and further including unit-identification data for use in identifying rental units that have been dispensed but not returned.

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2. Apparatus according to claim 1, wherein the housing has a plurality of compartments, each compartment for releasably storing one of said rental units therein.

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3. Apparatus according to claim 2, wherein the communication means comprises a plurality of interfaces, one such interface for each compartment.

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4. Apparatus according to claim 3, where each of said interfaces includes infrared communication means.

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5. Apparatus according to claim 1, wherein the record-member reading means includes magnetic reading means for reading prerecorded data from a conventional magnetic card credit card.

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6. A system according to claim 5, wherein the data processing means includes means responsive to expiration-date data prerecorded on such a conventional magnetic card credit card for verifying the validity of such credit card.



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7. A system according to claim 1, wherein each rental unit further comprises a rechargeable battery for supplying electrical power during use of the rental unit, and the housing includes means for supplying recharging electrical power to the rental units while they are stored in the housing.

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8. A system according to claim 7, wherein the housing has a plurality of compartments each configured to store one of the rental units, and wherein the means for supplying recharging electrical power includes a plurality of circuit interfaces, one such circuit interface for each compartment.

15

9. A system according to claim 1, wherein each rental unit includes controlled output means for communicating with a person using the rental unit and prompting means for prompting the return of the rental unit to the housing comprising means for disabling the controlled output means.

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10. A system according to claim 9, wherein the prompting means in each rental unit includes settable timing means, and wherein the housing includes setting means for setting the timing means.

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11. A system according to claim 1, wherein the system includes means for providing real-time data, wherein the data base includes a plurality of transaction records, and wherein the data processing means causes each transaction record to include real-time data as well as personal identification data.

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12. A system comprising:

5 a plurality of portable, electronic rental units, each including a case containing a rechargeable battery and having contacts thereon for receiving re-charging current for the battery;

a housing having a plurality of compartments for storing a plurality of said rental units;

10 interactive access-control means including displaying means, data input means, data processing means, and locking means in the housing;

the data input means including manually-operable input means for use in selecting a unit to be dispensed, and including electronically-controlled
15 record-member reading means for use in deriving prerecorded personal identification data from a record member;

the interactive access-control means having a plurality of modes of operation including a dispensing
20 mode in which the data processing means receives input data by causing the displaying means to prompt the use of the manually-operable input means to select a rental unit and by causing the record-member reading means to derive personal identification data, and in response to
25 the input data causes the locking means to release the selected rental unit so that it can be carried away from the housing, and further including a return-accepting mode in which a rental unit is returned to the housing and captured by the locking means therein;

30 means in each compartment for supplying recharging current via the contacts on the case of a rental unit stored in the respective compartment to recharge the battery within such stored rental unit;



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the data processing means including means for storing data into the memory means to generate a data base including personal identification data for use in billing for the rental of the rental items.

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13. A system according to claim 12, wherein the locking means comprises means within each compartment for releasably locking one of said rental units therein.

15

14. A system according to claim 12, wherein the record-member reading means includes magnetic reading means for reading prerecorded data from a conventional magnetic card credit card.

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15. A system according to claim 14, wherein the data processing means includes means responsive to expiration-date data prerecorded on such a conventional magnetic card credit card for verifying the validity of such credit card.

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16. A system according to claim 12, wherein each rental unit includes controlled output means for communicating with a person using the rental unit and prompting means for prompting the return of the rental unit to the housing comprising means for disabling the controlled output means.

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17. A system comprising:

a plurality of portable rental units, each having a communication interface, memory means, and means for transferring data bidirectionally between the communication interface and the memory means;

a housing for storing a plurality of said rental units;

interactive access-control means including displaying means, data input means, data processing means, and locking means in the housing;

the data input means including manually-operable input means for use in selecting a unit to be dispensed, and including electronically-controlled record-member reading means for use in deriving prerecorded personal identification data from a record member;

communication means for effecting data communication between the data processing means and the communication between the data processing means and the communication interface in each rental unit;

the interactive access-control means having a plurality of modes of operation including a dispensing mode in which the data processing means receives input data by causing the displaying means to prompt the use of the manually-operable input means to select a rental unit and by causing the record-member reading means to derive personal identification data, and in response to the input data causes personal identification data to be communicated to that stored in the memory means within the selected rental unit and then the locking means to release the selected rental unit so that it can be carried away from the housing, and further including a return-accepting mode in which a rental

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unit is returned to the housing and captured by the locking means therein;

mass memory means; and

5 the data processing means including means for storing data into the mass memory means to generate a data base including personal identification data retrieved from the memory means in each rental unit during the return-accepting mode of operation for use
10 in billing for the rental of the rental units.

15 18. A system according to claim 17, wherein the housing has a plurality of compartments; each compartment for releasably storing one of said rental units therein.

19. A system according to claim 18 wherein the communication means comprises a plurality of interfaces, one such interface for each compartment.

20 20. A system according to claim 19, where each of said interfaces includes infrared communication means.

25 21. A system according to claim 17, wherein the record-member reading means includes magnetic reading means for reading prerecorded data from a conventional magnetic card credit card.

30 22. A system according to claim 21, wherein the data processing means includes means responsive to expiration-date data prerecorded on such a conventional magnetic card credit card for verifying the validity of such credit card.



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23. A timed vending system comprising;
a plurality of rental units, each including
controlled output means for communicating with a person
5 using the rental unit;

a dispenser including a housing having a
plurality of compartments from each of which a rental
unit can be dispensed and into each of which a rental
unit can be inserted to return it;

10

the dispenser including means for accumulating
a data base for use in billing for the rental of the
rental units; and

means operable to prompt the return of a
rental unit to the dispenser including, in each rental
15 unit, settable timing means and means responsive to the
settable timing means for disabling the output means of
the rental unit, and including setting means in the
dispenser operative to set the settable timing means in
the rental unit being dispensed.

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24. A system according to claim 23, wherein the
setting means includes master timing means and means
for storing a predetermined value and means responsive
to the master timing means and said predetermined
30 value for setting the settable timing means.

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25. Data base generating interactive vending apparatus for use in renting portable rental units each of which has electronically readable means for providing unit-identification data, the apparatus comprising:

a housing for storing a plurality of said rental units;

interactive access-control means including displaying means, data input means, data processing means, and locking means in the housing;

the data input means including manually-operable input means for use in selecting a unit to be dispensed, and including electronically-controlled record-member reading means for use in deriving prerecorded personal identification data from a record member;

the interactive access-control means having a plurality of modes of operation including a dispensing mode in which the data processing means receives input data by causing the displaying means to prompt the use of the manually-operable input means to select a rental unit and by causing the record-member reading means to derive personal identification data, and in response to the input data causes the locking means to release the selected rental unit so that it can be carried away from the housing, and further including a return-accepting mode in which a rental unit is returned to the housing and captured by the locking means therein;

communication means for effecting communication between the data processing means and the electronically readable means in the rental units;

memory means; and



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the data processing means including means for storing data into the memory means to generate a data base including personal identification data data for use in billing for the rental of the rental units, and further including unit-identification data for use in identifying rental units that have been dispensed but not returned.

10 26. Apparatus according to claim 25, wherein the housing has a plurality of compartments, each compartment for releasably storing one of said rental units therein.

15 27. Apparatus according to claim 25, wherein the communication means comprises a plurality of interfaces, one such interface for each compartment.

20 28. Apparatus according to claim 27, where each of said interfaces includes infrared communication means.

25 29. Apparatus according to claim 25, wherein the record-member reading means includes magnetic reading means for reading prerecorded data from a conventional magnetic card credit card.

30 30. Apparatus according to claim 29, wherein the data processing means includes means responsive to expiration-date data prerecorded on such a conventional magnetic card credit card for verifying the validity of such credit card.



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31. Apparatus according to claim 25, and further comprising means for providing real-time data, and wherein the data base includes a plurality of transaction records, and wherein the data processing means causes each transaction record to include real-time data as well as personal identification data.

32. Data base generating interactive vending apparatus for use in renting portable, electronic rental units, each of which includes a case containing a rechargeable battery and having contacts thereon for receiving recharging current for the battery; the apparatus comprising:

15 a housing having a plurality of compartments for storing a plurality of said rental units;

interactive access-control means including displaying means, data input means, data processing means, and locking means in the housing;

20 the data input means including manually-operable input means for use in selecting a unit to be dispensed, and including electronically-controlled record-member reading means for use in deriving prerecorded personal identification data from a record member;

25 the interactive access-control means having a plurality of modes of operation including a dispensing mode in which the data processing means receives input data by causing the displaying means to prompt the use of the manually-operable input means to select a rental unit and by causing the record-member reading means to derive personal identification data, and in response to the input data causes the locking means to release the



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selected rental unit so that it can be carried away
from the housing, and further including a return-
accepting mode in which a rental unit is returned to
the housing and captured by the locking means therein;

means in each compartment for supplying
recharging current via the contacts on the case of a
rental unit stored in the respective compartment to
recharge the battery within such stored rental unit;

the data processing means including means for
storing data into the memory means to generate a data
base including personal identification data for use in
billing for the rental of the rental items.

33. Apparatus according to claim 32, wherein the
locking means comprises means within each compartment
for releasably locking one of said rental units therein.

34. Apparatus according to claim 32, wherein the
record-member reading means includes magnetic reading
means for reading prerecorded data from a conventional
magnetic card credit card.

35. Apparatus according to claim 34, wherein the
cata processing means includes means responsive to
expiration-date data prerecorded on such a conventional
magnetic card credit card for verifying the validity
of such credit card.

30



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36. A rental unit adapted to be dispensed by, be used remotely from, and be returned to, a dispenser in a rental system, the rental unit comprising:

5 a hand-holdable case having engaging means adapted for use in releasably locking the rental unit within the dispenser;

the case containing means supporting electronically-controlled input/output means for inter-
10 active communication with a person using the rental unit; circuit means for electronically controlling the input/output means, and a master data processing subsystem for controlling said circuit means; and

the case further having means defining a data
15 communication interface coupled to the master data processing subsystem for use in communicating data while the rental unit is locked in the dispenser.

20

37. A rental unit according to claim 36, wherein the engaging means comprises a recess for receiving a locking member.

25

38. A rental unit according to claim 36, wherein the case includes means for holding a rechargeable battery for use in supplying operating power for the
30 circuit means and the master data processing subsystem, and wherein the case has externally facing contacts and means for conducting recharging current received on the contacts to the rechargeable battery.

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39. A rental unit according to claim 36, wherein the master data processing subsystem includes readable means for storing unit-identification data and means
5 for reading the readable means to supply the unit-identification data to the data communication interface.

10

40. A rental unit according to claim 36, and further comprising settable timing means, connected to
15 the data communication interface to receive an interval-defining data signal, for timing out an interval in accord with the received interval-defining data signal, and switching means responsive to the timing means for disabling the circuit means.
20

25

41. A rental unit according to claim 36, and further including memory means, and wherein the master data processing subsystem includes means for writing data into the memory means in response to data received
30 by the data communication interface and means for retrieving data from the memory means to supply such retrieved data to the communication interface.

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1 42. A hand-holdable electronic entertainment unit
for use in a rental system, the unit comprising:
a case having means defining a circuit
5 interface and means defining a data communication inter-
face;
a rechargeable battery connected to the
circuit interface, thereby adapting the unit to receive
recharging electric power;
10 controllable output means, operating under
electrical power supplied by the rechargeable battery,
for communicating with a person renting the unit;
settable timing means, connected to the
communication interface to receive an interval-defining
15 data signal, for timing out an interval in accord with
said interval-defining data signal; and
means responsive to the timing means for
disabling the controllable output means.

20
43. A unit according to claim 42, wherein the
data communication interface includes means for receiving
25 an infrared signal.

30 44. A unit according to claim 42, wherein the
unit further includes memory means, and means coupled
between the data communication interface and the memory
means.
35



AMENDED CLAIMS

[received by the International Bureau on 14 February 1985 (14.02.85);
original claims 1-6, 25 (partly) to 30, and 32 (partly) to 35 amended as
indicated on the following (4) pages]

1. A system comprising:

a plurality of portable rental units, each
having electronically readable means for providing
5 unit-identification data;

a housing for storing a plurality of said
rental units;

interactive access-control means including
displaying means, data input means, data processing
10 means, and locking means in the housing;

the data input means including manually-
operable input means for use in selecting a unit to be
dispensed, and including electronically-controlled
record-member reading means for use in deriving
15 prerecorded personal identification data from a record
member;

the interactive access-control means having a
plurality of modes of operation including a dispensing
mode in which the data processing means receives input
20 data by causing the displaying means to prompt the use
of the manually-operable input means to select a rental
unit and by causing the record-member reading means to
derive personal identification data, and in response to
the input data causes the locking means to release the
25 selected rental unit so that it can be carried away
from the housing, and further including a return-
accepting mode in which a rental unit is returned to
the housing and captured by the locking means therein;

communication means for effecting communication
30 between the data processing means and the electronically
readable means in the rental units;

memory means; and



1 the data processing means including means for
storing data into the memory means to generate a data
base including personal identification data for use
in billing for the rental of the rental units, and
5 further including unit-identification data for use in
identifying rental units that have been dispensed but
not returned.

2. Apparatus according to claim 1, wherein the
10 housing has a plurality of compartments, each compart-
ment for releasably storing one of said rental units
therein.

3. Apparatus according to claim 2, wherein the
15 communication means comprises a plurality of interfaces,
one such interface for each compartment.

4. Apparatus according to claim 3, where each of
said interfaces includes infrared communication means.
20

5. Apparatus according to claim 1, wherein the
record-member reading means includes magnetic reading
means for reading prerecorded data from a conventional
magnetic card credit card.
25

6. A system according to claim 5, wherein the
data processing means includes means responsive to
expiration-date data prerecorded on such a conventional
magnetic card credit card for verifying the validity
30 of such credit card.



1 the data processing means including means for
storing data into the memory means to generate a data
base including personal identification data for use in
billing for the rental of the rental units, and further
5 including unit-identification data for use in identifying
rental units that have been dispensed but not returned.

26. Apparatus according to claim 25, wherein the
housing has a plurality of compartments, each compart-
10 ment for releasably storing one of said rental units
therein.

27. Apparatus according to claim 25, wherein the
communication means comprises a plurality of interfaces,
15 one such interface for each compartment.

28. Apparatus according to claim 27, where each of
said interfaces includes infrared communication means.

20 29. Apparatus according to claim 25, wherein the
record-member reading means includes magnetic reading
means for reading prerecorded data from a conventional
magnetic card credit card.

25 30. Apparatus according to claim 29, wherein the
data processing means includes means responsive to
expiration-date data prerecorded on such a conventional
magnetic card credit card for verifying the validity
of such credit card.

30

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1 selected rental unit so that it can be carried away
from the housing, and further including a return-
accepting mode in which a rental unit is returned to
the housing and captured by the locking means therein;
5 means in each compartment for supplying
recharging current via the contacts on the case of a
rental unit stored in the respective compartment to
recharge the battery within such stored rental unit;
the data processing means including means for
10 storing data into the memory means to generate a data
base including personal identification data for use in
billing for the rental of the rental items.

33. Apparatus according to claim 32, wherein the
15 locking means comprises means within each compartment
for releasably locking one of said rental units therein.

34. Apparatus according to claim 32, wherein the
record-member reading means includes magnetic reading
20 means for reading prerecorded data from a conventional
magnetic card credit card.

35. Apparatus according to claim 34, wherein the
data processing means includes means responsive to
25 expiration-date data prerecorded on such a conventional
magnetic card credit card for verifying the validity
of such credit card.

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Fig. 1

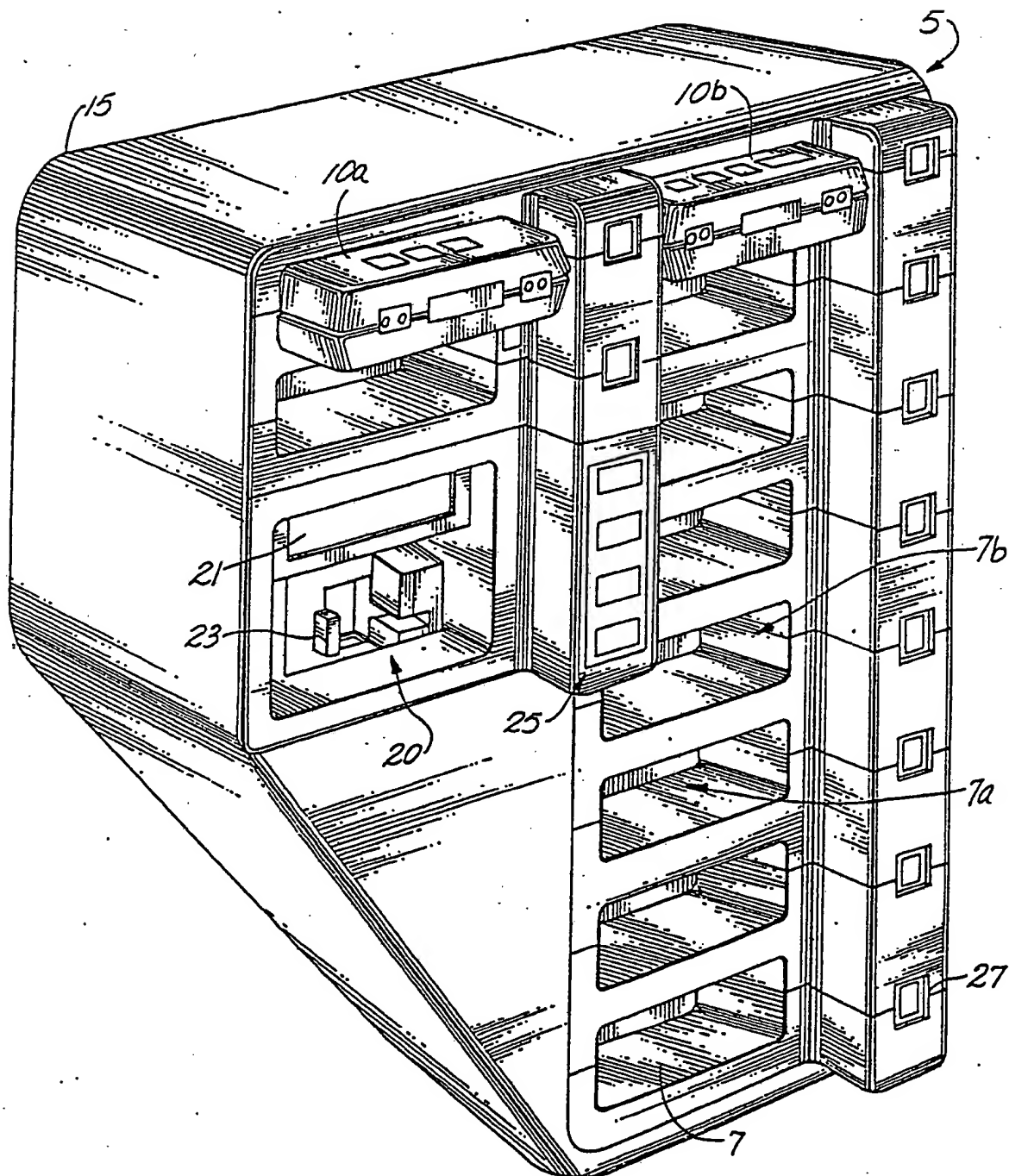


Fig. 2

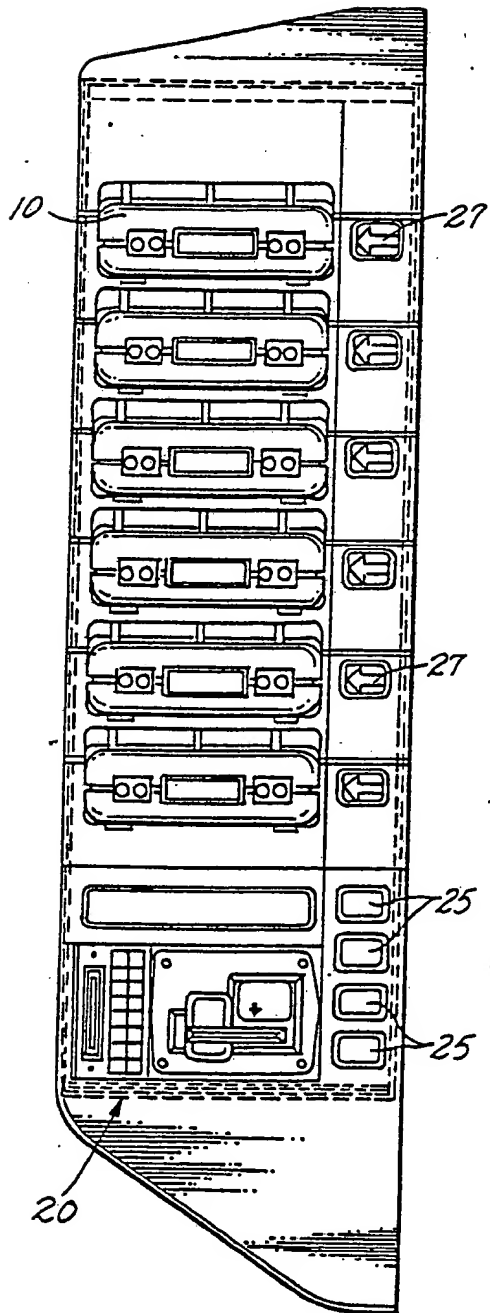
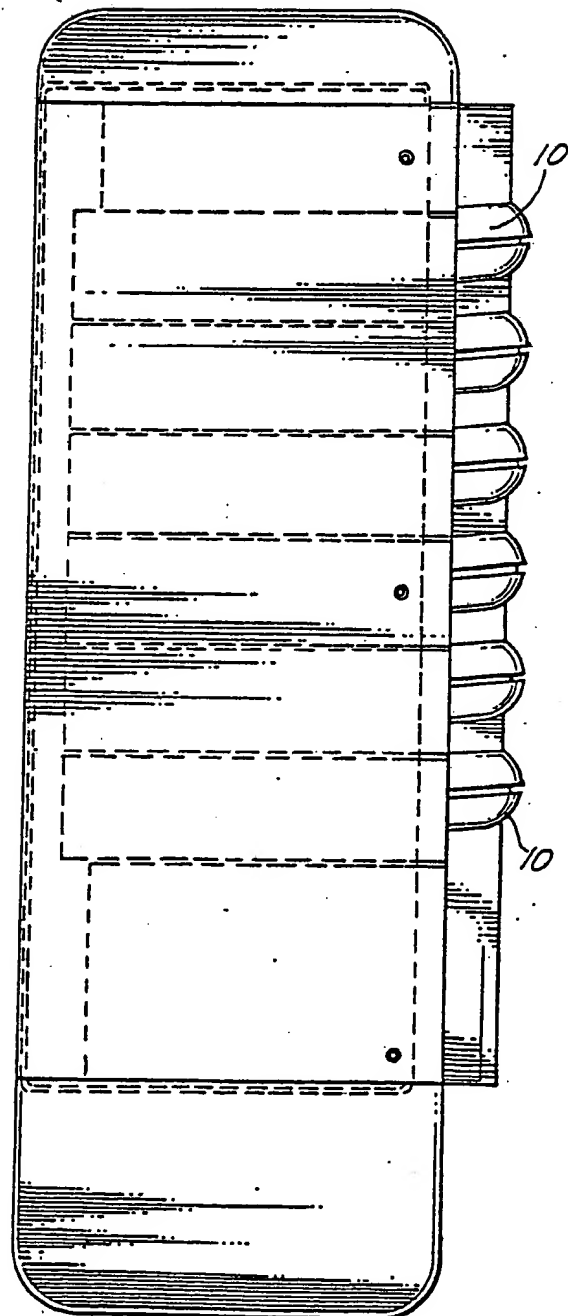


Fig. 3



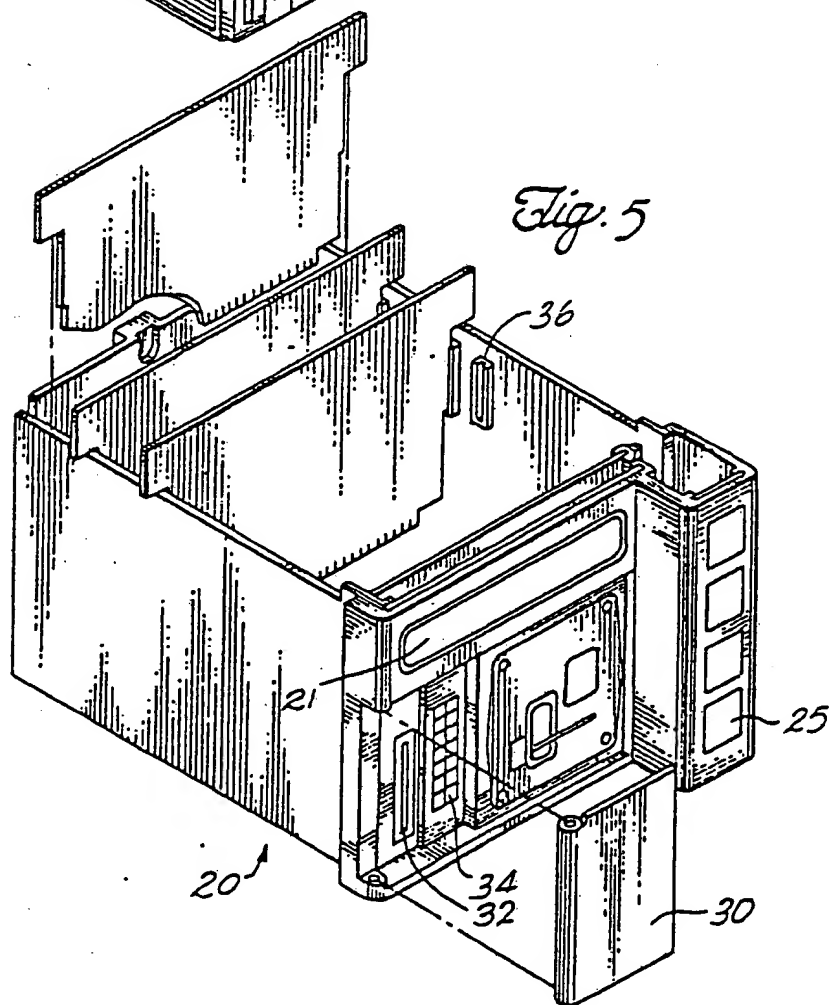
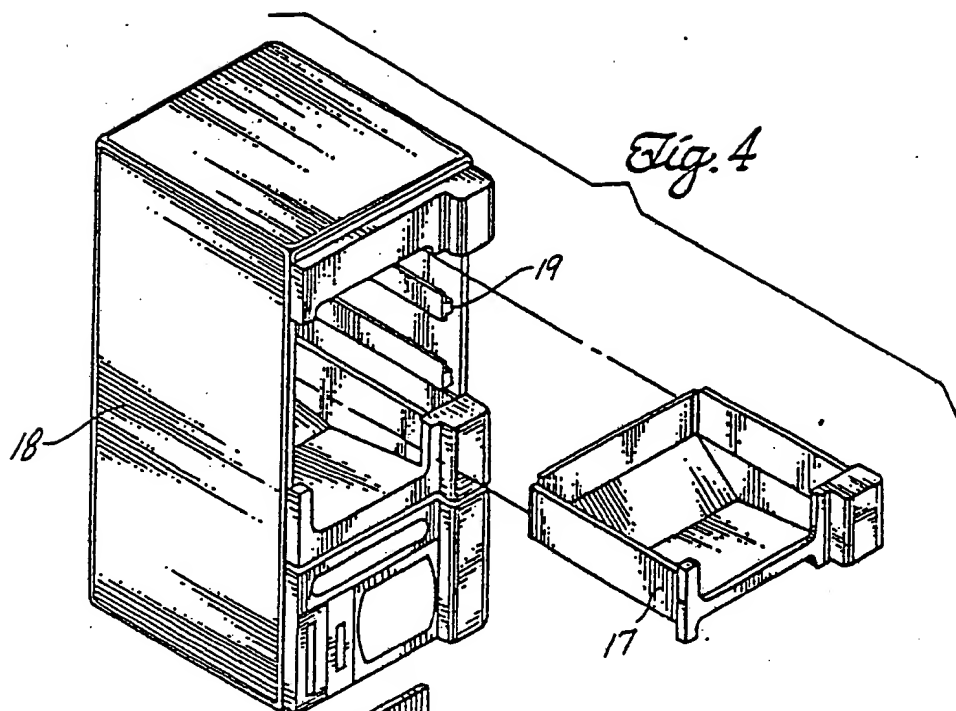
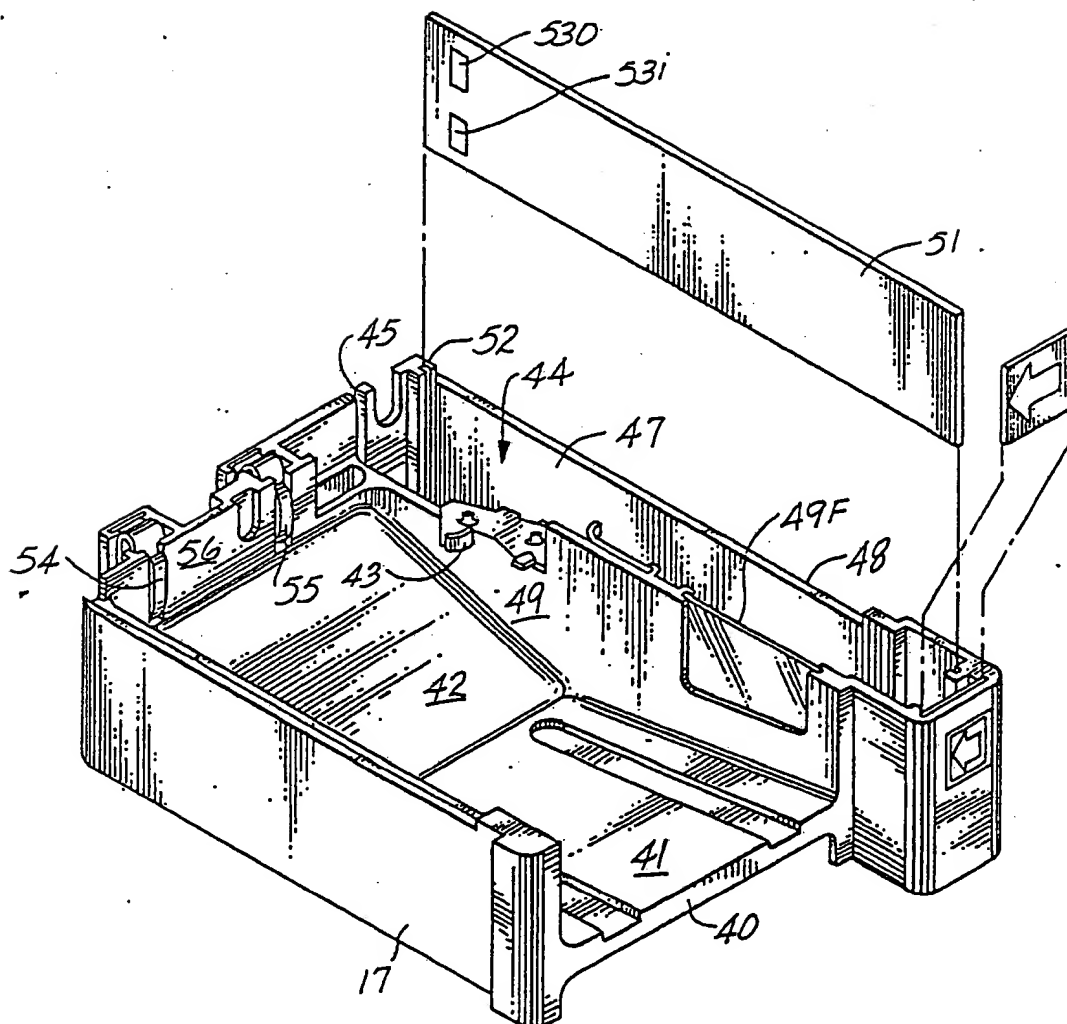


Fig. 6



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Fig. 7A.

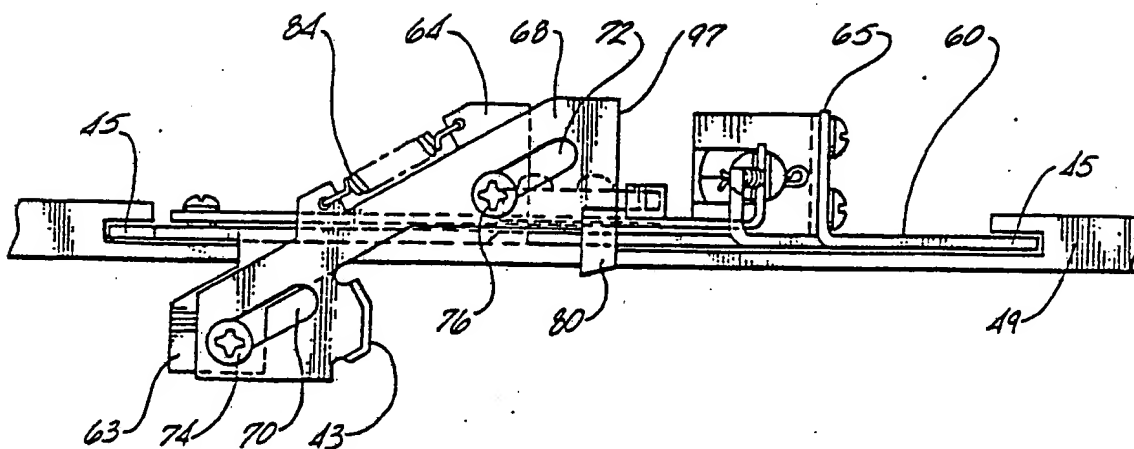
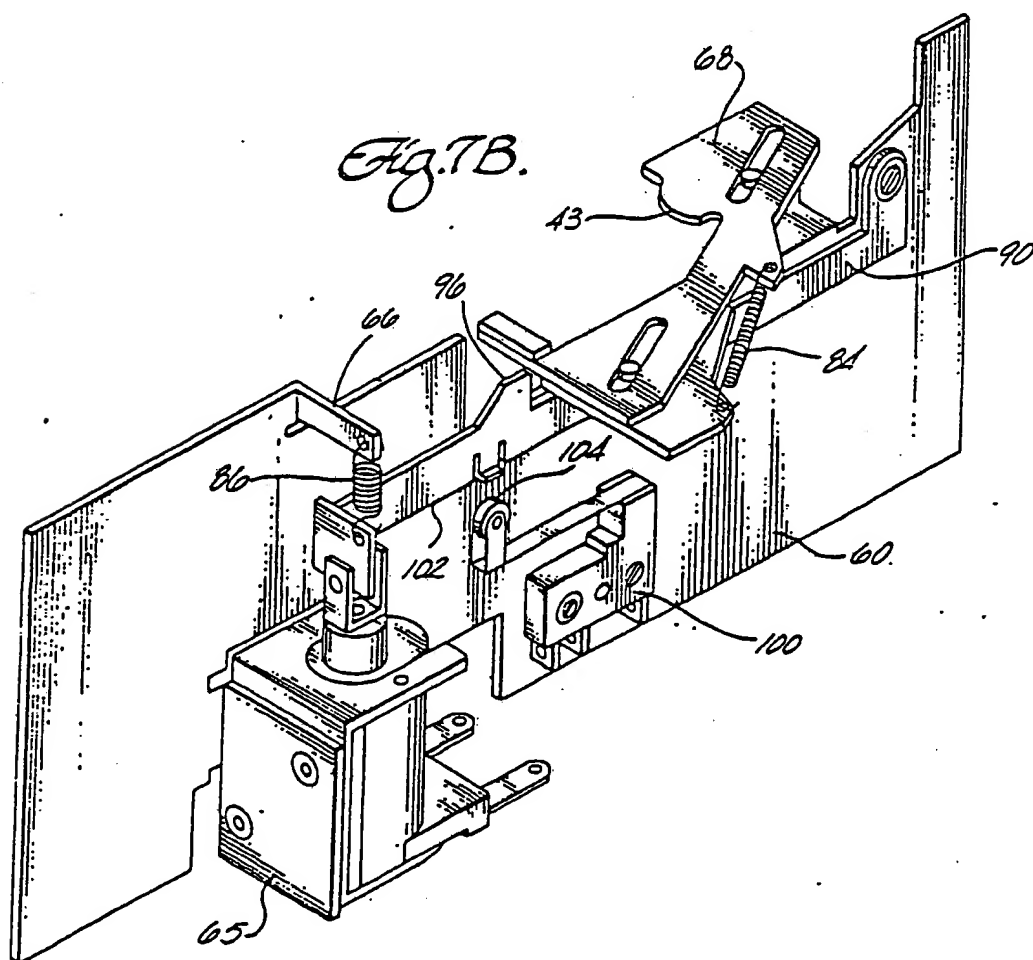


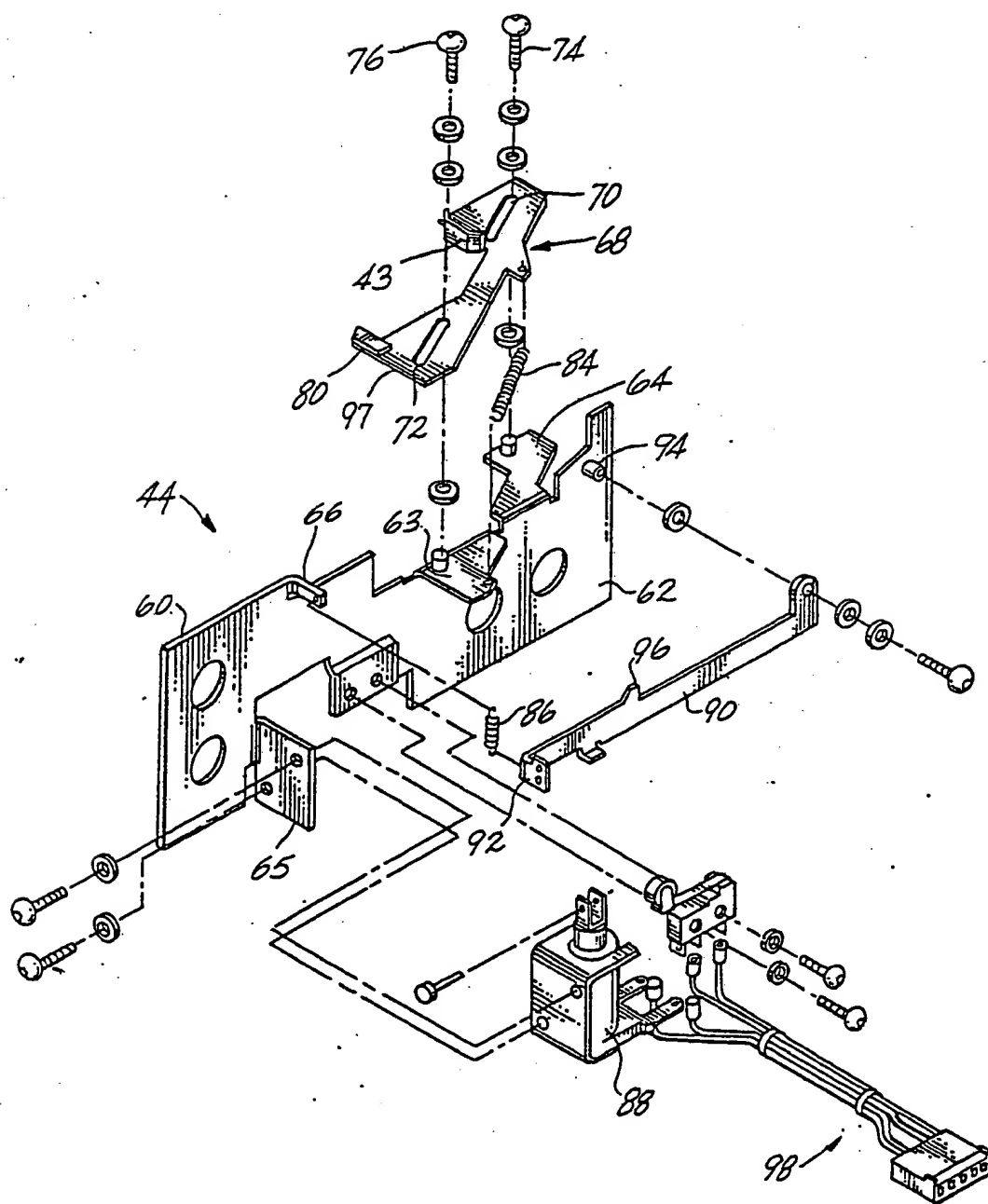
Fig. 7B.



SUBSTITUTE SHEET



Fig. 7c



SUBSTITUTE SHEET



Fig. 8c

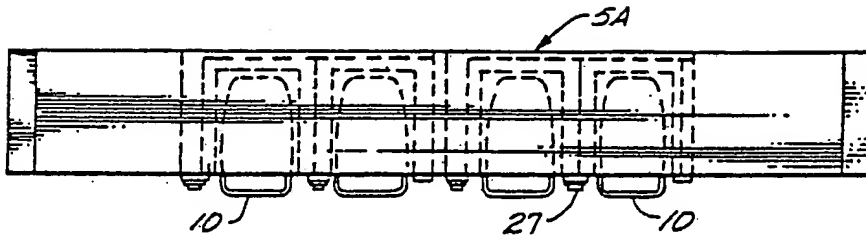


Fig. 8A

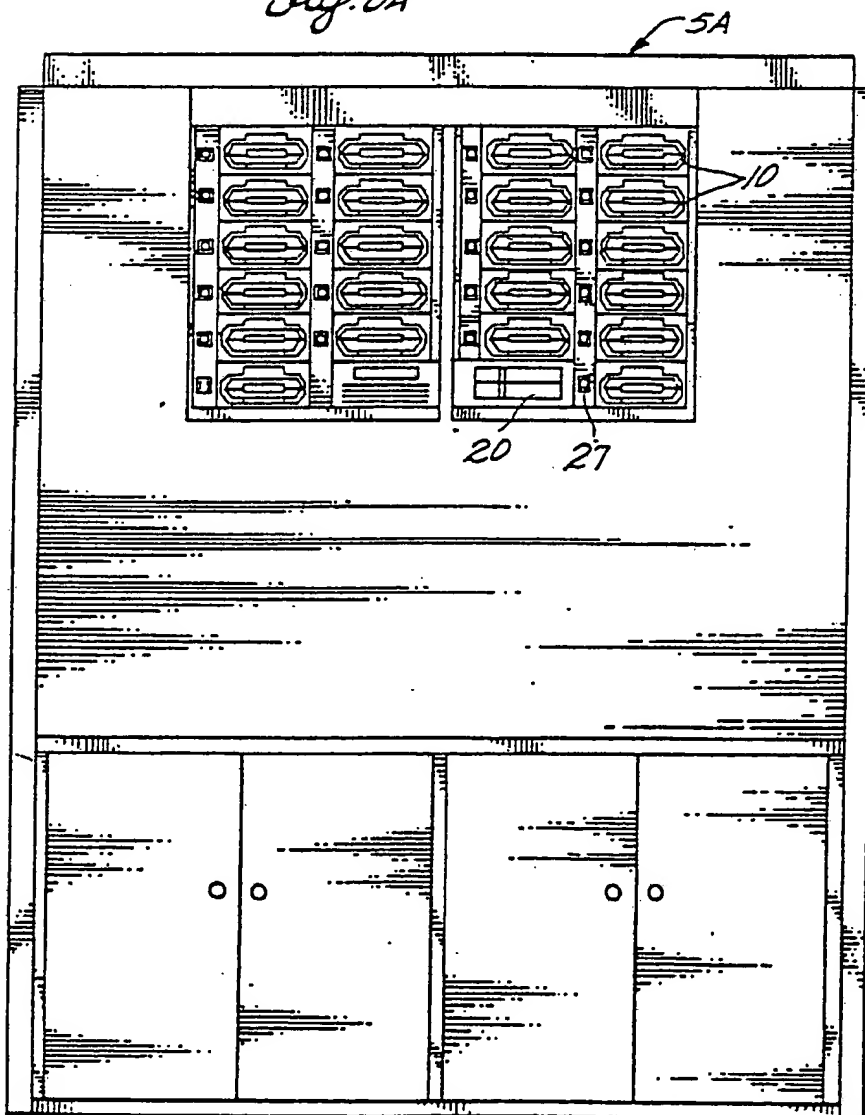


Fig. 8B

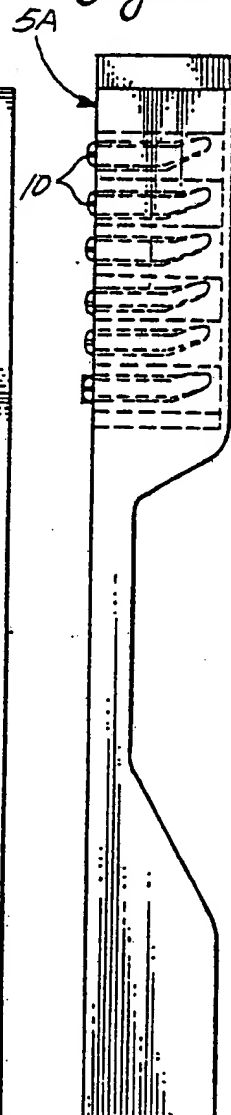


Fig. 9.

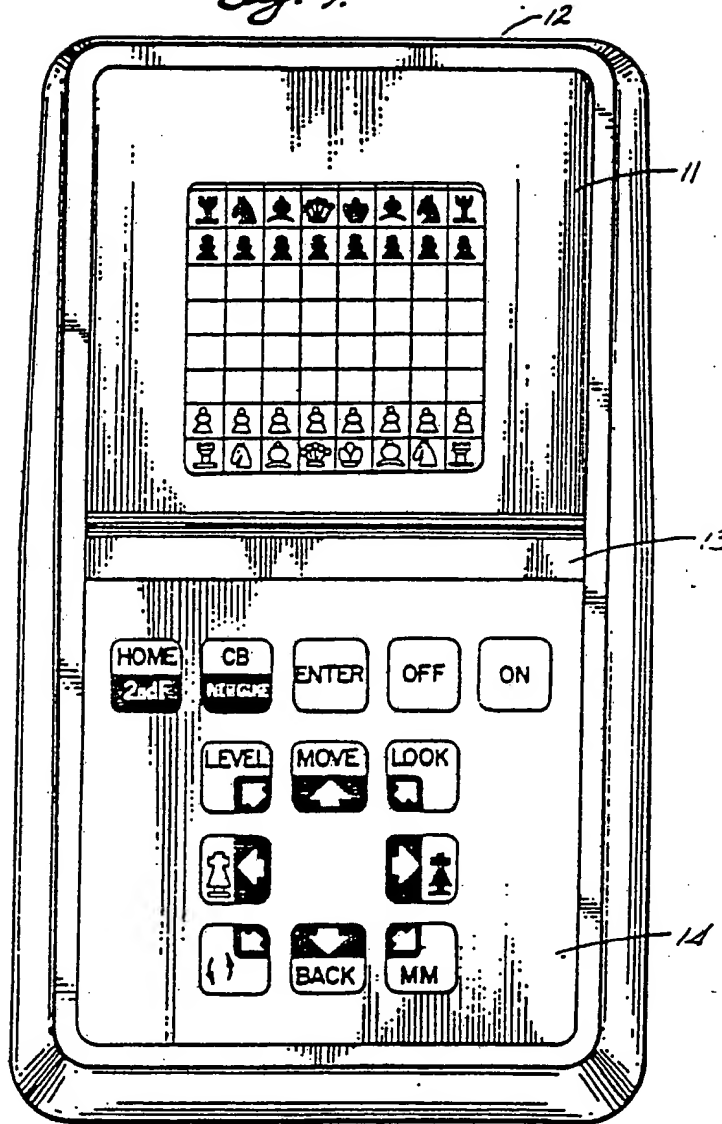


Fig. 10.

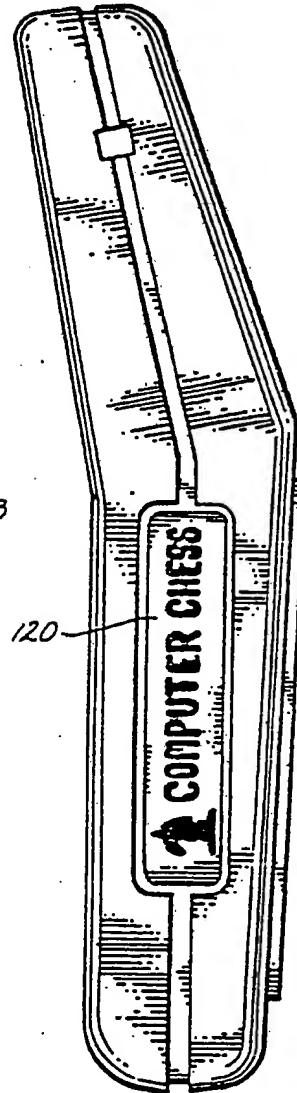


Fig. 11.

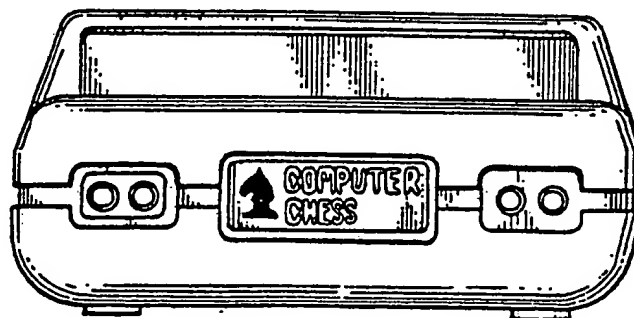


Fig. 12.

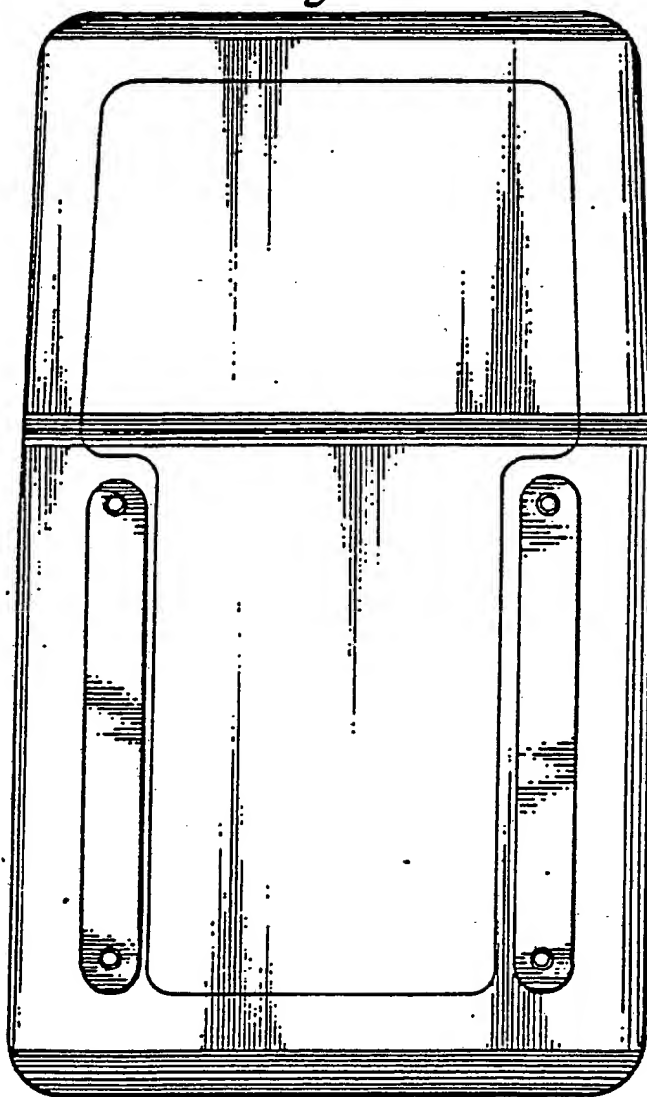
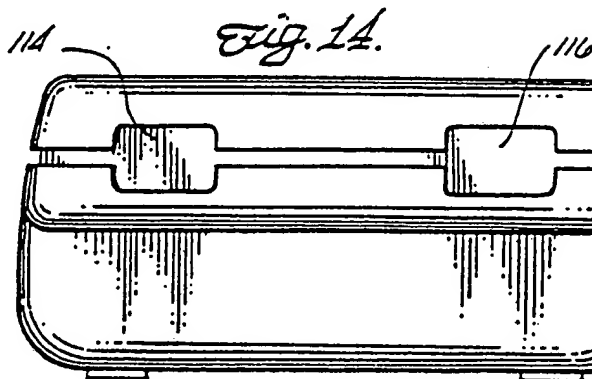
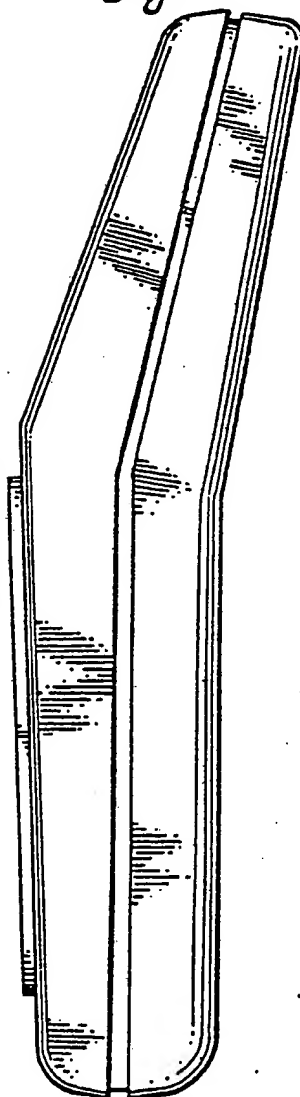


Fig. 13.

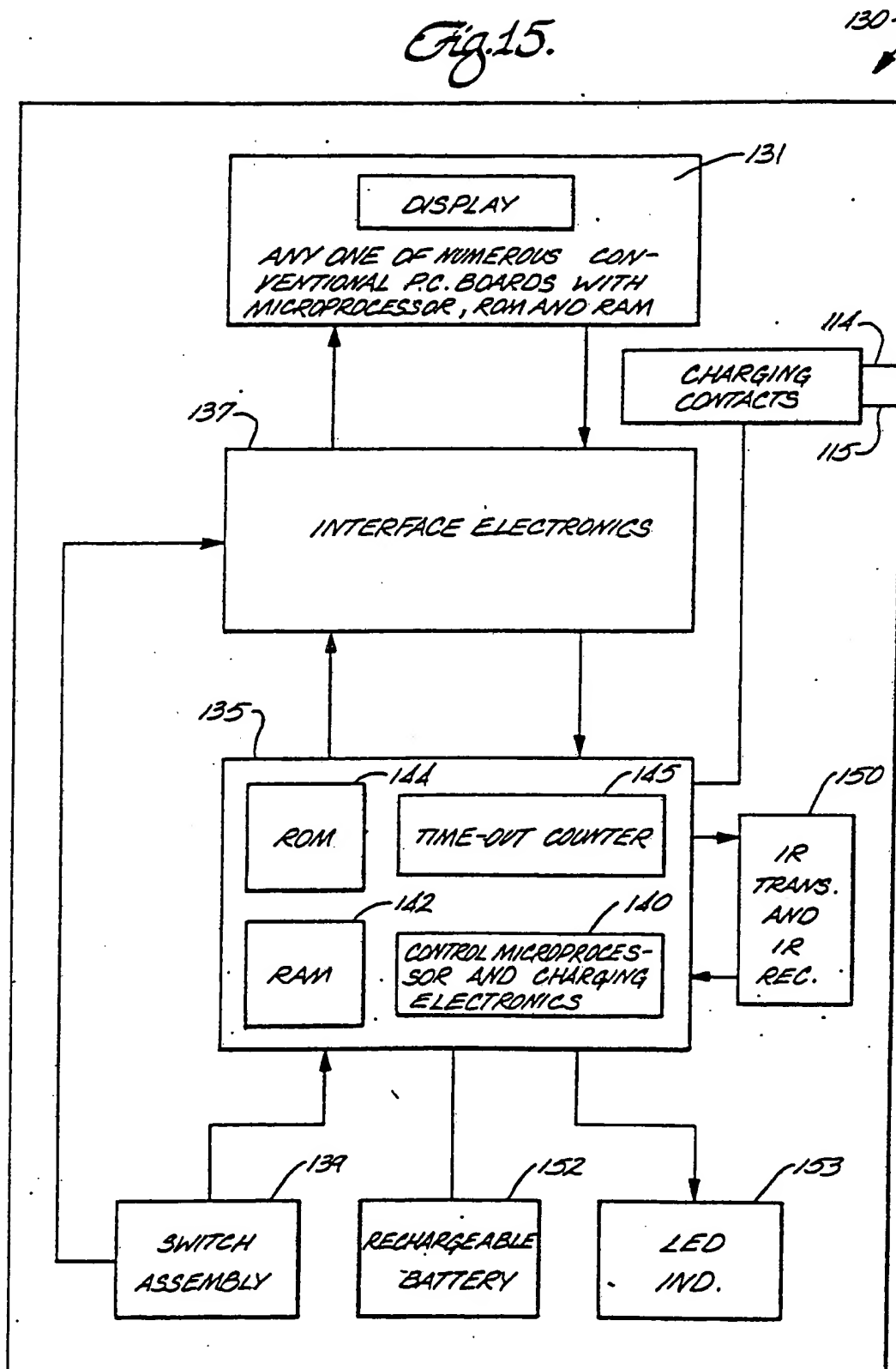


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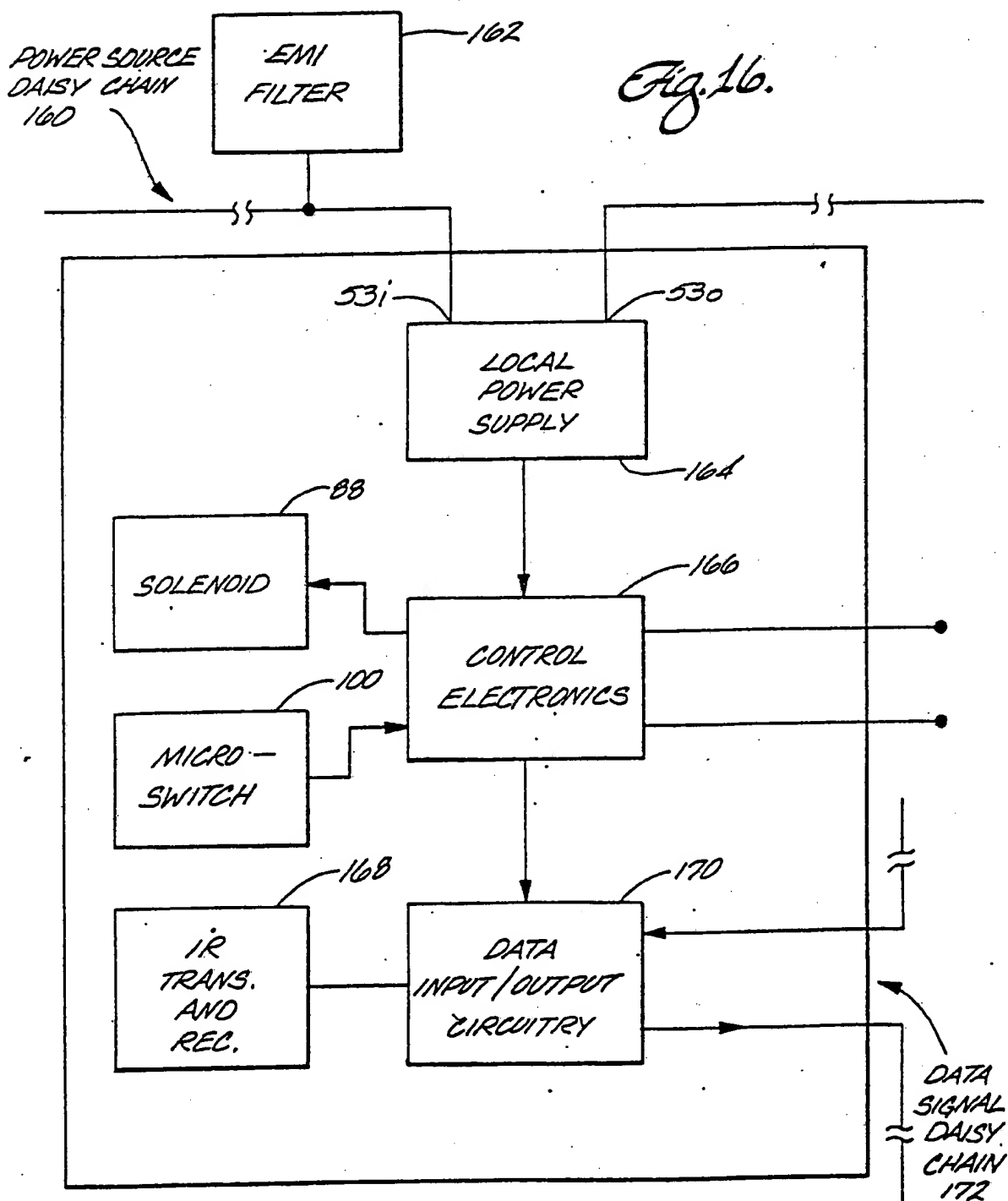
Fig. 15.



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SUBSTITUTE SHEET



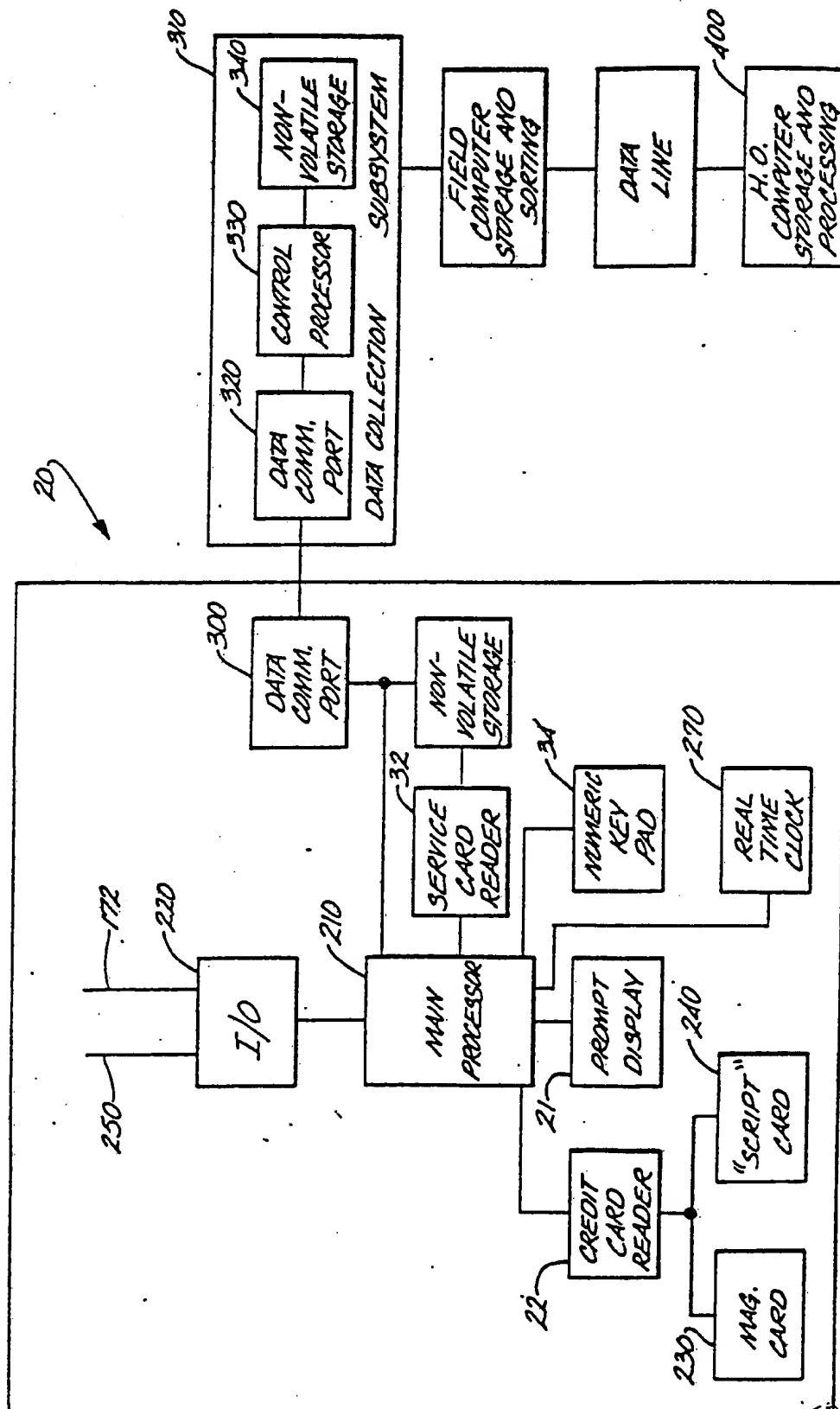
INTERNATIONAL SEARCH REPORT

International Application No PCT/US84/01668

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
INT. CL. ³ G06F 7/08; G07F 7/02; H02J 7/00		
U. S. CL. 364/479; 235/381; 194/4R, 9T, DIG 18		
II. FIELDS SEARCHED		
Minimum Documentation Searched *		
Classification System	Classification Symbols	
U. S.	194/2, 4R, 9T, 40, 49, 64, DIG 18 221/27, 28, 29, 154, 287; 235/381; 320/2, 12 364/479	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴		
Category *	Citation of Document, ¹⁵ with Indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
A	U.S., A, 3,840,795 (Roszyk et al) 08 October 1974.	4, 20, 28 and 43
A	U.S., A, 3,933,231 (Vinet) 20 January 1976.	
A	U.S., A, 4,096,428 (Hanson et al) 20 June 1978.	
A	U.S., A, 4,120,452 (Kimura et al) 17 October 1978.	
A	U.S., A, 4,141,078 (Bridges, Jr. et al) 20 February 1979.	
Y	U.S., A, 4,150,284 (Trenkler et al) 17 April 1979.	
A	U.S., A, 4,179,064 (Yoshioka et al) 18 December 1979.	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: ¹⁶</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search ¹	Date of Mailing of this International Search Report ²	
16 November 1984	04 DEC 1984	
International Searching Authority ¹	Signature of Authorized Officer ¹⁹	
ISA/US	<i>Gerry Smith</i>	

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Fig. 17.



FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

Y	U.S., A, 4,229,829 (Grunwald et al) 21 October 1980, see especially figures 12A, B and column 8, lines 17-42.	7, 8, 12-16, 32-35, 38, and 42
A	U.S., A, 4,300,040 (Gould et al) 10 November 1981.	
Y,P	U.S., A, 4,419,616 (Baskins et al) 06 December 1983.	36-44

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹⁰

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers _____, because they relate to subject matter ¹² not required to be searched by this Authority, namely:
2. ☐ Claim numbers _____, because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out ¹³, specifically:

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ¹¹

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:
3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No ¹⁸
X, P	U.S., A, 4,458,802 (Maciver et al) 10 July 1984.	1-3, 5, 9-11 17-19, 21, 23-27, 29 and 31
Y, P	U.S., A, 4,458,802 (Maciver et al) 10 July 1984.	2, 6-8, 12- 16, 20, 22, 28, 30 and 32-44